

THE AMERICAN
BEEKEEPERS
GUIDE.

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THE AMERICAN *Bee-Keepers' Guide*;

A NEW AND RE-WITTEN EDITION OF THE
BEE-KEEPERS' GUIDE BOOK,

A COMPLETE
MANUAL AND REFERENCE BOOK ON ALL SUBJECTS CON-
NECTED WITH SUCCESSFUL

BEE-CULTURE,

IN BOTH

COMMON AND MOVABLE-COMB HIVES.



DRONE.



WORKER.



QUEEN.

GIVING PLAIN DIRECTIONS FOR THE MANAGEMENT OF BEES, IN EVERY
MONTH OF THE YEAR, WITH ALPHABETICAL INDEX, AND
THOROUGHLY ILLUSTRATING THE

New System of Bee Culture with the Honey Extractor.

CONTAINING, ALSO, PRACTICAL DIRECTIONS

HOW TO REAR ITALIAN QUEEN BEES.

BY

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COBURG, MONTGOMERY COUNTY, IOWA,

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"Winke für Bienen-Züchter," &c,

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TO THE PRESS.

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INTRODUCTION.

I am informed that Mr. Krctchmer has written a new work on the most successful management of the Honey-bee, in either common or movable-comb hives. The work will undoubtedly be the most valuable ever placed before the American bee keeping community, the author having the facility of obtaining the most thorough information from German, Italian, French, English and American writers on the subject, embracing the latest discoveries and improvements in bee-keeping. His thorough knowledge of practical bee culture, perfected in his extensive traveling, and experiments conducted whilst residing in Italy and Germany, as well as in the United States, is indeed sufficient guarantee for the great value of his work ; and his improved movable-comb bee-hive, acknowledged by eminent apiarians of the American, German, and French nations as the most perfect hive in existence—it being made the “standard hive,” by the bee keepers of Germany, and has also received the highest award, a *silver medal*, at the late Paris Exposition.

His experience with the Italian bee, long before they were introduced into the United States, will be found of unequalled value in the chapter on that variety, and many, heretofore mysterious points will be found thoroughly explained.

J. R. DODDS.

PREFACE.

I feel that in placing this work before the public, a preface is due them as well as myself, to show us at a glance the *guiding* rule and object observed in its preparation. Some books on the subject that are offered for sale, contain a large amount of superfluous matter, which only aids to produce a volume of *respectable size*, increasing its selling price and not the practical value—placing it, in many cases, beyond the reach of those who would be purchasers. My object has been to produce a work containing the most valuable knowledge, to effect which all available information has been consulted, and I feel myself much indebted for the aid I have received from the writings of Dzierzon, Knauf, Huber, Bevan, Assmus, Scudamore, Debeauvay, LaVay, Kleine, Wagner, Langstroth, King, Quinby, and many others.

To ascertain the most practical points, all embodied in this work has been thoroughly tested for years, and it will convey: 1st. A knowledge of the nature of the

honey-bee. 2d. Directions for their management in *compliance with their nature.*

To bring the work within the reach of all, it has been condensed to the smallest possible scope consistent with a full exposition of the subject, with plain directions for the various most profitable operations in either common or movable-comb hives.

Although the edition of the "Bee-Keeper's Guide Book" published in 1868, was acknowledged as complete and "ahead of the time;" the advance in the science of bee-culture, since its publication, has been so great, and all other books on the subject, to our knowledge, of even a prior date, that we deemed it necessary to destroy our electrotype plates, and at great expense re-write and re-set the work in order to embrace all the latest improvements; which, we flatter ourselves, will be of interest to even the advanced bee-master, as many of the improvements were made in foreign countries, obtained in some instances by private letter, or from publications foreign to many of our bee-keepers.

E. KRETCHMER.

COBURG, Iowa, September, 1872.

THE AMERICAN BEE-KEEPERS' GUIDE.

CHAPTER I.

NATURAL HISTORY OF THE HONEY-BEE.

A SWARM OR A COLONY OF BEES.

A colony of bees in a normal condition, or during the swarming months, consists of three kinds—a queen, a few hundred drones, and several thousand workers—although it is not necessary that these three kinds of bees be present to have a swarm. A queen, with a handful of worker-bees is, properly viewed, a swarm; and if there are as many as sixty thousand to a single queen, it is yet but a swarm.

The following table of the average number, measure,

and weight of bees, without comb, will give the reader a more correct idea of a swarm of bees for profitable and successful management :

15,000 bees, or a little more than one gallon, constitute a medium swarm.

25,000 bees, or about seven quarts, constitute a good swarm.

35,000 bees, or about ten quarts, are called a large swarm ; yet as many as fifty thousand bees are occasionally found in a single swarm.

When the amount or number of bees is to be ascertained by weight instead of measure, the following is the average weight ;

100 drones weigh about.....1 ounce.

290 worker-bees weigh about.....1 ounce.

We give the above to enable parties who may be desirous of making experiments to ascertain, either by measuring or weighing, the number of bees ; also to enable the beginner to judge whether he purchases a medium, good or large swarm, since the expression, "a swarm of bees," does not define the amount.

THE QUEEN.

The queen is the only perfect female in a hive. In form she is of slender structure, compared with either drone or worker—though a little larger around the

thorax than the worker. Her wings are comparatively short, barely covering one half of her body. The queen of the black species is of a darker color upon the black than either the drone or the worker; differing, however, from the Italian species; the queen being of a brighter color than either Italian drone or worker, the larger part of her body being of a golden color.

The queen is hatched from an egg, which, were it not supplied with a peculiar fluid, called royal jelly, would hatch to be a worker bee; but if, from causes hereafter described, the queen should be lost, or in the swarming season another queen is to be raised, the bees select an egg in a cell of worker-comb as near as possible to the margin, remove the partitions of three next adjoining cells, destroy two of the eggs, and nurse the selected one. But if there be no eggs in the worker-comb in the hive, any larva of worker-bees, not hatched more than three days, is selected, and the cells enlarged as above. This larva, as well as the one hatching from the selected egg, is supplied with a large amount of royal jelly, which the bees, if confined to their hive and supplied with water, can obtain from the honey and bee-bread stored in their hive. Its taste is more sour than that used for feeding the drone or worker larvæ, and when fresh resembles starch.

The bees then continue the building of the cell, and from time to time increase the supply of royal jelly.

The cells, when completed, resemble a small pea-nut, about an inch deep, and one-third of an inch in diameter.

The walls or sides of queen-cells are very thick, and therefore require much wax, which as soon as the queen is hatched, is used elsewhere and the cell cut down by the bees, until it resembles a small acorn cup.

While other cells open sideways, the queen-cells hang generally with their mouth downward. The number of queen-cells in one hive is from one to thirty-five, but usually not over six.

The queen-cell is left open eight days from the time the egg is laid. The egg remains unchanged three days ; on the third or fourth day a small white worm is hatched from it, swimming in the royal jelly. In this way it remains for five days, growing larger every day ; the workers then close the cell, and she immediately begins to spin her cocoon, and in sixteen days from the time the egg was laid, it will be a perfect queen. In order to become qualified to lay both male or female, drone or worker-bee eggs, the queen must be fecundated by a drone or male bee. The fecundation of the queen is naturally effected outside of the hive ; for this purpose she leaves the hive between the third and fifth day after she is hatched, if the weather is favorable.

The fecundation of the queen once accomplished is efficacious during life, or so long as she remains healthy and vigorous, and she never afterwards leaves the hive, except when issuing with a swarm. The ovary, or egg-bag of the queen, is not impregnated in copulation; but a small globular sac, called spermatheca, situated on the side of the oviduct, the tube through which the egg passes in the act of laying, and communicating therewith. This sac becomes charged with the semen of the drone, called spermatozoa. All eggs germinated in the ovary of the queen tend to develop as males, and do develop as such unless impregnated by the male sperm while passing the mouth of the spermatheca in descending the oviduct. In the act of laying an egg in a worker-cell, a compression of the abdomen of the queen takes place. By this compression, the egg in descending the oviduct receives a very small portion of the spermatozoa, as it passes the mouth of the spermatheca. In the act of laying an egg in a drone-cell, no such compression takes place, consequently the egg receives no spermatozoa. Some of our modern writers advocate that the compression determining the sex of the bee is caused by a pressure from the sides of the cells. They say, "The worker-cells are so small that the abdomen of the queen, in laying the eggs in these cells, is slightly pressed by the side of the cells, while the drone-cells are large enough to admit the abdomen of the queen without that pressure." I, myself, be-

lieved at one time that this *might* be the case, until, in the summer of 1864 I discovered eggs in the worker-cells not quite one-eighth of an inch in depth. I at once removed this piece of comb to my observing hive, (it having no queen,) and I now observed minutely the result. The bees built the cells to their natural depth, and the bees hatched from them proved *perfectly developed workers*. Here the question arose—what caused the compression that pressed the spermatheca so as to fecundate the egg? when it is impossible, from the shape of the queen, to have such cells cause even the slightest pressure on her in the region where the spermatheca is situated. The fact led me to believe that the queen can effect or omit the impregnation of the egg at pleasure.

From the theory of impregnation above given it will be seen that any impure impregnation does effect the *worker* egg, and as the queen is raised from such an egg, only impure queens can be the result; whilst under the same theory of impregnation the drones of an Italian queen, impregdated by a black drone, must be pure Italians, yet some writers claim that impregnation has a tendency to effect the drone progeny, so that a pure Italian queen, when impregnated with a black drone, would produce drones slightly impure; to settle this controversy as far as possible, prior to the writing of this work, I made a series of experiments, by having a number of queens impregnated in confinement.

I first took a queen known to be pure Italian, and had her impregnated by a black drone; now if these writers were correct this queen would produce impure drones; I next took a pure Italian queen and had her impregnated with drones raised from the first queen; next I took brood from the second queen and raised a queen from it; now if these writers are correct this queen (No. 3) would herself be impure; this queen No. 3 I had impregnated with drones from queen No. 1; adding, according to the theory of these writers, impurity to impurity. Again, a queen was raised from No. 3, and this No. 4 queen I had impregnated with drones like those of queen No. 1, and thus I continued the process given for queens No. 3 and 4 for eleven generations; adding, according to these writers, impurity to impurity twelve consecutive times. Now for the result, queen No. 12 produces a progeny, either of queen, worker or drone, as pure and bright as ever an imported or home-bred queen ever did, thus fully substantiating the theory as first given as correct.

A queen having wings so imperfect that she cannot fly from her hive, or from any other cause remains unfecundated, she ordinarily does not lay eggs. Still, exceptional cases do sometimes occur, and the eggs then laid produce drones only. If, in consequence of superannuation, the contents of the spermatheca of a fecundated queen become exhausted, or, if from enervation

or accident she loses the power of using the muscles connected with the spermatheca, so as to be unable to impregnate the passing egg, she will thenceforth lay drone eggs only.

As a rule, more than one queen is never tolerated in a hive; all except one have to leave it, or a combat will occur between them, in which all but one must perish. When two queens meet they clinch each other, and thus remain until one has a chance to thrust her sting (with which she is provided) into the abdomen of the other. She will never use her sting otherwise. Her hatred even extends to the young queens in the cells, and she frequently attempts to destroy them, but is not always successful, as the nursing bees will do their best to protect the inmates of these cells. Yet, exceptional cases have been reported where two queens remained together in harmony. E. Gallup had two stocks in the winter and spring, between 1868 and '69, each having two queens; one he removed to a queenless colony, and the other retained both queens until June.

The queen is able to lay from 2,000 to 3,000 eggs in a day; and in my observing hive, I have seen her lay seven eggs in one minute.

Many believe it impossible that so great an amount of eggs can be fertilized from a single connection with the drone; but my friend, S. H. Kridelbaugh, M. D.,

a thorough entymologist, and of great experience in dissecting queens under powerful microscopes, advances the following theory: "In the act of copulation the organ of generation is torn from the drone and retained by the queen for nearly three days, during this time the germ becomes ingrafted into the queen, and only the hull or crude portion is cast off; through this germ or cion the queen is enabled to supply a continuous flow of spermatozoa, similar to a fruit tree which, by the ingrafting of different cions, can produce two or more different varieties on the same stem."

The eggs of bees are of a lengthened, oval shape, with a slight curvature, and of a bluish-white color. In the act of laying, the egg is besmeared with a glue-like substance which causes it to adhere to the upper side of the base of the cell, where it remains for three days unchanged; on the fourth day they are hatched, and a small white worm can be seen at the bottom of the cell, surrounded with a white, transparent fluid, deposited in the cell by the nursing bees, and from which the worm nourishes; on growing larger, it coils itself up, until it forms a ring. About five days after hatching from the egg, the bees seal over the cell with a brown cover, composed of bee-bread and wax: the out-side shape of these caps are convex, and cannot be mistaken from the caps of cells filled with honey, as they are of pure wax, of a lighter color, and concave in shape.

As soon as the cell is sealed over, the worm or larva begins to spin around itself a white, silky film called cocoon, by which it is incased, and after undergoing its change it is called nymph. In twenty-one days from the time the egg was layed it comes forth a perfect worker.

THE DRONES.

The drones make their appearance a short time before the swarming season commences, usually about the end of April. They are of a clumsy and bulky structure, with wings large enough to cover the entire abdomen, and when flying are easily recognized by their loud hum. They do not labor—never gather honey from the flowers, nor carry bee-bread to the hive, being physically disqualified to perform any of these labors, their proboscis being too short for extracting the honey from the flowers; being also without a honey sac for carrying honey, and without baskets or grooves for carrying bee-bread or bee-glue like the workers, their sole purpose of existence is to impregnate the young queens. Without drones the young queens would remain barren, and the entire race of the honey-bee would become extinct. As the impregnation is naturally effected on the wing in the open air, the drones leave the hive about noon on pleasant days, and as soon as the service of impregnation is supposed to be accomplished for the

season, they are excluded from the hive by the workers, and destroyed. This wholesale drone-slaughter extends to the whole drone-brood in the hive, which is torn from its cells. The time for this drone-slaughter varies with the abundance or deficiency of forage; if wet or dry weather causes a deficiency in forage, the killing of drones will at once begin, while under an abundant supply of forage they are frequently retained until September, and ancient bee-keepers relied on a good honey harvest when the drones were tolerated until late in the season. Queenless colonies, however, do retain the drones in their hive, even through winter, with the hope of obtaining a fertile queen. A stock of bees retaining the drones after all others are destroyed may be noted as having lost its queen. As drones live upon pure honey from the hive, but gather none, a large number in every hive would be a great loss to the bee-keeper; and as a single one will impregnate a queen for life, but few need be reared. Where several colonies are kept, a few dozen in each hive would be enough, in the aggregate, for the intended purpose.

The amount of drones can easily be regulated by the use of movable-comb hives, for by removing nearly all the drone-comb, and having its place occupied by comb with worker cells, the over-production of drones is prevented; thus not only the amount of honey usually consumed by the drones is saved, but the additional number of worker-bees raised instead will greatly aid

in the collection of honey for their master's table, or in the collection of bee bread and in breeding an additional force.

THE WORKERS.

The workers, or common bees, are those seen on flowers ; they are the smallest bees in the hive, furnished with a tongue or proboscis, with which they obtain the honey from the flowers and convey it to their honey-bag. This receptacle is of the size of a small pea, and is surrounded with muscles which enables the bee to compress it and empty its contents through the proboscis into the cell.

The hindmost legs of the workers are provided with a spoon-shaped hollow or basket to receive the bee-bread as soon as gathered from the flowers.

Every worker is armed with a sting—its point is barbed like the point of an arrow, and therefore it can seldom withdraw it. In losing the sting it parts with a part of its intestines and will soon perish. Through the entire length of the sting is a groove connecting with a bag filled with poison and serves to convey the poison to the wound.

Every worker is provided with pouches for secreting wax ; these pouches are situated under the rings of their abdomen. All the work, as gathering, building of

comb and nursing of brood, except the laying of eggs, is done by the workers.

In queenless colonies, no longer having the requisite means of rearing a queen, common workers are sometimes found to lay eggs from which drones, and only drones, proceed. Such laying workers are unfecundated, and eggs are uniformly layed by some individual bee, regarded more or less by her companions as their queen. So long as a fertile queen is present in the hive, the bees do not tolerate a fertile worker. Nor do they tolerate one while cherishing the hope of being able to rear a queen; in rare instances, however, exceptional cases occur. Fertile workers are sometimes found in hives immediately after the death of the queen, and even in the presence of a young queen so long as she has not herself become fertile. Such fertile workers are reared next to a queen-cell, and some of the royal jelly, intended for the queen-larva, has accidentally dropped into the next cell. Fertile workers will also lay their drone-producing eggs in cells of worker-size, from which dwarfed drones are reared (which usually die before emerging from their cells). In one instance bees attempted to rear a queen from such an egg, which proved upon opening the cell to be a drone drowned in the royal jelly.

The age attained by workers reared in the spring is not more than two months. They generally work

themselves to death. Notched and torn wings are the signs of old age. Such as are raised in the fall will live about six months. By introducing an Italian queen, we are able to arrive at their age, as all the young will be of a different color, and by counting from the time the queen was introduced until the time when all the black bees disappear, we have the length of life of those that were just mature at the time the queen was introduced.

BROOD AND BREEDING.

The breeding is, to a large extent, dependent : 1st. On the strength of the colony: 2d. On the amount of food, (honey, bee-bread and water): 3d. On the season of the year. Stocks having the first two requisites will usually begin in the latter part of January, occupying at first a small circle in the centre of the cluster of bees, exactly opposite on each side of the comb. This circle is enlarged ; small circles of brood begun on the next adjoining combs, spreading more and more as spring advances, until, during the hight of swarming-time, it occupies nearly all the cells not occupied by bee-bread or honey ; after the swarming season is over the amount of brood decreases until about November, when breeding ceases for that year.

The brood of a fertile queen is compact and uniform, while the brood of a fertile worker or an unimpregnated

queen is scattered nearly over the entire comb, hardly ever more than two or three cells being together. The caps over this brood project nearly one-eighth of an inch, and are called by the Germans, "Buckel brood" (hump-brood).

CHAPTER II.

PRODUCTS AND PASTURAGE OF BEES.

WAX.—COMB AND COMB-BUILDING.

Many persons believe that wax is gathered by the bees from flowers, but this idea is erroneous. Wax is a secretion of the bee, and is formed only when the bee is richly provided with food, like fat in the animals, but with this difference, that while fat grows upon the higher animals without their knowing it, the production of wax is entirely optional with the bee. It is fully within the power of the bee to make wax or to omit it. In order to produce wax, the worker-bees take considerable more pollen and honey than is necessary to appease their hunger. Experiments made by Dzierzon of Germany, proved that it required nearly twenty pounds of honey to produce a single pound of wax. Additional experiments made by G. Kretchmer, proved that it required at least thirteen pounds of honey to

make one pound of wax, which is the least amount consumed for one pound of wax produced in any experiment to our knowledge; it generally requiring more. Dr. Kirtland says that even as much as *twenty-five pounds* are consumed before one pound of wax or comb is produced.

In the chyle-stomach, or stomach proper, the materials are first transformed by a partial digestion into food, sap or jelly, and this, after twenty-four hours, is thoroughly digested and passes into the blood from which it is secreted as wax, in the form of thin, irregular pentagonal white flakes or scales looking like selenite, between the segments of the abdomen, through the thin wax skin of the bee into a separate apparatus.

The wax secreting apparatus is on the under or lower side of the abdomen, and it is formed of six segments; these segments consist of two parts, the inner being a thin, soft, translucent skin or membrane, the posterior a harder, darker skin, covered on the outside with hair. The first or soft part is surrounded by a horny rim with a point on each side. Through the centre of the wax-secreting apparatus runs a horny partition deviding it into two equal parts, whereby these wax-secreting segments form twelve superficies, which, as the apparatus is oval, are longer in the middle at the third segment, and smaller towards one end. In shape these superficies form irregular pentagons. The horny rims of the wax-

skins or membranes are connected by a delicate membrane with the next segment, and the wax-skin itself is drawn back under the hard outer skin, so that the superficies form six pair of pockets into which the wax substance penetrates through the wax-skin or membrane and receives the shape and size of the respective superficies.

As soon as the secretion of wax has commenced, the bees at once begin to use the wax-scales for the construction of comb. This comb-building has its beginning at the highest point of the hive accessible to the bees and the centre of their cluster. In the act of building the comb, each of these flakes or scales is grasped by a pincer formed at one of the joints of the leg and conveyed to the mouth of the insect where it is reduced by the mandibles and proboscis to a softened condition previous to being added to the wall of the cell; and more than this, the hexagonal form of the cell is simply that naturally assumed by cylinders of soft material subjected to equal and uniform pressure from each other, the length and proportions of the antennæ enabling the bee to built the walls in the first place in the form that they would necessarily assume under such pressure; yet, at the same time, in building the cell of the queen where the hexagonal shape is not necessitated, they may be used in making such cells of circular form. The wax has thus been traced from its origin to its deposition in the walls of the cells, and these facts,

whether more wonderful or not, certainly appear to explain the origin and formation of the honey-comb more clearly than the supposition that the wax is gathered by the bees, or that it evaporates from the bees like a *fume* until in some intangible manner it is made to stop and "crystalize around hexagonal cells." [The fume theory of honey-comb formation was published in the *American Artisan* in 1867.]

The weight of new comb required to fill a hive of ordinary size is about two pounds; to produce this comb, at least thirty pounds of honey are consumed, and taking into consideration the time lost by the bees while building it, (which might be otherwise employed in gathering honey), it would make each pound of wax equivalent to at least twenty-five pounds of honey. This honey, at thirty cents per pound, would make the cost of each pound of comb seven dollars and fifty cents.

From these figures the bee-keeper can judge the value of good comb, for, if melted into marketable wax, it would seldom bring more than fifty cents per pound, making a loss of seven dollars.

All good comb should be employed in the hive. If movable-comb hives are used, worker-comb can readily be fastened in the frames by dipping one edge into melted wax and attached with it; even drone-comb, if not *too dark colored*, should be used in the honey-boxes.

All small pieces of wax should be saved. Several pieces may be fastened together with melted wax into a movable-comb frame, and if such combs are given to a new swarm they will fill them in a very short time, and usually swarm the same season; or such comb may be given to strong colonies, and frames filled with honey taken instead, and should any colony, at the approach of winter, be deficient of stores, such frames with honey are "just the things" to be inserted.

The cells or cups of comb are of two sizes. Those in which worker-bees are reared, are called worker-cells, or worker-comb; and those in which drones are reared, are called drone-cells, or drone-comb. The worker-cells are smaller than the drone-cells; five worker-cells measuring one inch in width—one square inch containing twenty-five cells on each side. The diameter of such comb, or the depth of two cells, with one bottom or base between, measures about seven-eighths of an inch. The drone-cells are wider, four cells measuring one inch in width, and one square inch contains sixteen cells on each side. The thickness of such comb is nearly one and one-fourth of an inch. Where both sizes of cells are built on one comb, small, five-sided intermediate cells are built between them. Those cells in which honey is stored are of both sizes, and vary greatly in depth.

SCRAP BOX.

Every bee-keeper should have a box with a close fitting cover, substantially made, so that the moth-miller cannot enter, and it should be large enough to hang whole combs in. In this box every piece of comb however small, should be collected; from these scraps good pieces may be selected to put in honey boxes, or used wherever needed; but if not fit to use otherwise, may be saved in this box, and honey, if stored on comb-frames, may also be kept in it. This box must always be kept closed, in a dark, dry room, or else the combs are liable to be destroyed by moth or mould.

REMOVING OLD COMB.

Many bee-keepers using the common box hive, are in the habit of breaking out the lower half of the comb, the result of which usually is, the bees do not swarm for that year, unless the season is very favorable. Some writers even advocate the practice of removing all the combs every four years, notwithstanding the great value of the comb. Experience has given ample proof that comb from two to three years old is preferable to new comb. Every cocoon left by the hatched bees makes the comb more and more a non-conductor of heat and cold, being better adapted for wintering and early

breeding. If, in the fall of the year, we place new comb side by side with old comb in the center of the hive, we find invariably that the breeding begins in the old comb. Mrs. Tupper speaks of a stock of bees that had been on the same comb for fourteen years, which had swarmed annually, and were, at the time of her examination, in a prosperous condition. I, myself, purchased a stock of bees in the common box hive, which had been the property of the former owner for ten years, without removing a piece of comb; and he assured me that it was an old stock when he purchased it. In transferring the bees to a moveable-comb hive, I found the comb tolerably straight, although dark, and fastened them on the frames. The same comb is yet in use, and occupied by one of my best stocks.

The practice of removing all the comb every four years, is pronounced as a very objectionable management, by nearly all practical bee-keepers throughout the United States and Germany.

While advocating the use of every piece of good comb, we by no means mean to say that we leave the defective comb in the hive. Where moveable comb hives are used, thorough examination should be made in the spring. Take an empty hive, open the first stock you come to, take out the combs one by one, look over them, and if sound, set them in the new hive, bees and all; in this manner remove all the comb and bees. If

from imperfect ventilation, the lower edge should be mouldy, it should be cut off; or if some other part of the comb contains old and hard bee-bread, or candied honey, (which the bees cannot remove,) it would be a nuisance in the hive, and such parts, and *no more*, should be cut out. While making examinations of the combs, note the amount of bees each stock has, amount of brood, and if no brood, look for the queen, to ascertain whether or not the stock is queenless. Remove from the hive all that may be obstructive or offensive to the bees, and repair the hive if needed, and in this manner examine every stock of bees in your apiary. Any bee-keeper who will not consider this as too tedious a job, will certainly be rewarded for the labor, with healthy stocks, and early, strong swarms.

HOW TO SECURE STRAIGHT COMBS IN THE MIDDLE OF THE FRAMES.

A movable comb hive is only a *movable-comb* hive when *all* the combs are built true within the frames, so that each comb can be removed without cutting or breaking or injuring the brood, and without crushing the bees. To obtain these results, many experiments were tried, and comb-guides designed; among the earliest of which, probably, Kretchmer's comb-foundation comb-guides can be counted,—who invented and used them in Germany, I think as early as 1843. The device consisted

of a narrow strip of tracing linen, coated with a composition of white wax and starch, and upon which the comb-foundation or base of the cells were impressed, by passing it through a pair of engraved rollers. This strip he fastened in the middle of the moveable-comb *bars* of the Dzierzon hive, and on which the combs were built by the bees. This device, however, was superseded, about the year 1849, by the more simple and cheaper triangular strip of wood attached in its stead. Upon the first introduction of movable-comb frames into this country, many bee-keepers failed to obtain the comb within the frames, and many do fail yet, in defiance of some contrivances used to effect the desired result. Attaching strips of comb to the under side of the top bar of such frames as have no effectual comb-guide, is a very good practice, when the comb can be obtained without cutting it from other hives. If such pieces of comb are pieces of worker-comb, it secures the object of obtaining worker-comb instead of drone-comb, as the bees generally continue the building of that comb with which it is started. The triangular comb-guide, above-named, has since been adopted in this country, but instead of using it on a movable-comb bar, it is attached to the under side of the frame top, so as to have a sharp corner projecting downward. This is the most valuable device yet known, and is universally adopted. Another method, is the variable cross-bars which consists in having every alternate cross-bar two inches

lower than the intervening ones, it being intended that the lower bars will compel the bees to build their combs true upon the higher ones; and if these are lengthened down, as they usually are, before others are begun, they must build true upon the lower bars also; the comb on the higher bars limiting the space to build otherwise. This is a very good arrangement for the bars in the center of the frames, but when the principle is applied to the top bars,—that is, making every alternate top bar so thick, as to have it project two inches below the intervening bars—it would be very objectionable, on account of the uneven height of comb, and the increased distance the bees would have to travel to reach the honey boxes, which not only would postpone a commencement of the work in them, but sometimes entirely prevent it. The best method of assuring true comb in any kind of frame, having the above-named triangular comb-guide on the top bar, and so arranged as to have the frames running from front to rear, is to tip the hive forward so as to stand about twenty-five degrees from perpendicular. By thus tipping the hive forward, the rear corners of the frames are made to be the highest point in the hive in which the bees will cluster, and begin their comb on the rear end of the comb-guide, and the bees, hanging in clusters, are thus brought to connect directly with the corner of the comb guide, on which they take additional hold, and to which they are almost certain to attach the comb. In

tipping a hive, care must be taken to have the *sides* of the hives plumb, else the bees, building their comb always plumb, would have the lower part of the comb out of the frame. The hive must be tipped as soon as the bees are hived ; if delayed until combs are started, tipping would not induce them to discontinue their work and begin differently elsewhere. When frames with narrow tops are used, the lower corners of the top bars should be rounded off ; the spaces between them enable the bees to cluster between and above the top bars, and they frequently fail to start the comb within the frames, as the corners of the top bar being higher than the comb-guides would induce the bees to commence their comb on them, and the bees clustered between and above would furnish ample chances for additional hold to the comb-building cluster of bees.

In the improved movable-comb frame, the top bars fit closely to each other, leaving no projecting corners or space for bees to cluster in ; the corner of each comb-guide being the only projections presented to them. The openings for honey box communication being in the *middle* of each frame, and directly *above* the comb-guides, if occupied by the bees, can only aid in obtaining the comb true within the frame. Since their invention, the tipping of hives is superfluous, having the stand level and the *sides* of the hive exactly perpendicular, is the only care necessary.

PROPOLIS, OR BEE GLUE.

This glue is a resin-like substance, obtained by the bees from buds and limbs of trees, especially from the different kinds of pine, the willow and horse-chestnut ; they carry it, like bee-bread, in the little hollow of their hindmost legs, to their hive, and it is used to glue or seal up every small crevice about the hive. This labor should be saved the bees, it being sticky and therefore difficult for bees to work with ; and as the summer heat keeps it soft in the hive, the moth-miller selects it to deposit her eggs, especially if the crevice is not thoroughly filled. All cracks, crevices, and corners of a hive should be sealed up by pouring in them a mixture made of three parts resin and one part wax, melted together, which remains hard and bids defiance to the moth-miller.

POLLEN.

Often called farina, but generally known as bee-bread. It is the blossom dust of flowers, gathered by the bees, moulded to the shape of a very small, flattened ball, and carried in the small hollow of the hindmost legs to the hive, where it is used for the preparation of royal jelly, for the nourishment of the young bees, and for mixing with wax used for sealing over the brood. But a very small portion is used by the mature

bees for digesting the honey, which is their principal food.

The color of pollen varies to all shades—white, yellow, and red, according to the color of the blossoms from which it is gathered. Some pollen which is not needed for immediate use, is closely packed in the worker cells for future use, and often covered with honey, and capped over with wax. By the use of movable-comb hives, some of this bee-bread may be taken from strong stocks and given to those that are destitute of this article, by merely removing a comb containing bee-bread, and giving it to such as should need it.

Bees always prefer to gather fresh bee-bread, even when there is a large amount in the cells. In early spring, before the bees are able to obtain it from blossoms, a substitute for pollen should be given them. Take unbolted rye meal and put it dry into shallow troughs, about two inches deep, and set them about one rod in front of the hive; or, take a comb from the hive, and fill from 200 to 300 empty cells with dry rye meal or buckwheat flour. A better substitute for bee-bread can be made as follows: Take yolks of eggs, hard boiled, and unbolted rye meal or buckwheat flour, of equal parts, mix it with a little honey and feed as above directed. I have used wheat flour, mixed with bran, which the bees carried into the hive very

greedily, until they could obtain the pollen from blossoms of the willow and elm. But rye meal is preferable.

During cloudy, cold and windy weather it is frequently impossible to feed bees with dry meal in troughs; At such times we supply our bees in their hive with dry meal or flour, through our Combined Feeder and Hive Ventilator, (prescribed in the back pages of this book); to use it, enlarge the holes in the screw cap to about one-eighth inch diameter, put in the meal loosely and place the feeder over the cluster of bees.

HONEY.

Honey is gathered by the bees from flowers, blossoms of trees, and other sweets, of which the honey-dew in some seasons yields a large amount. Two species of honey-dew have been discovered, of which one is merely an exudation from the leaves of trees, especially the oak, and the other a discharge from the bodies of plant lice.

Honey should be stored in a box, glass or other convenient vessel, separate from the main hive or breeding apartment, so that the honey may be free of bee-bread or brood, or extracted with the newly invented

“Honey Extractor,” and put up in glass jars, cans, or barrels.

SURPLUS HONEY FROM THE COMMON BOX HIVE.

The common practice of *robbing* bees in late summer—that is, to remove the top of the common hive, and cut out nearly all the honey from above, is a very objectionable and usually injurious practice. While a large portion of such honey is stored in combs in which a brood has been previously raised, each bee hatched leaving her mantle or cocoon in the cell, a still larger portion is impaired with the bee-bread stored in the comb, and thus no marketable honey is obtained, while for table use it is far from being that delicious sweet, stored in fresh white comb, free from bee-bread and other impurities.

In the act of removing, it frequently occurs that the queen is killed; and if in autumn, a new queen cannot be raised to substitute for her loss, the loss of the whole colony is the consequence. While removing, a large amount of honey is lost, running over the bees and down the bottom board; robber bees are enticed, and the stock usually suffers severely. By the use of separate boxes that difficulty can be avoided. The boxes should be tight; cracks or crevices would allow the heat from the hive to escape, needed in the early

part of the honey season, to aid in softening the wax for comb-building. By using a composition, described under the head of "bee-glue," much time may be saved by the bees. The boxes should not be more than four or five inches high, and protected against rain and the direct rays of the sun, by an outer box, cover or cap. To induce the bees to commence work in the boxes, pieces of clean, empty comb should be attached to the under side of the top, and placed directly over the breeding apartment, with large openings under each box, to admit the bees and warm air from below. When the boxes are first adjusted, begin early in the season supplying a few strong stocks first, (giving one box to each,) and when the bees have commenced in them, give boxes to the next strongest, and so on until all are supplied. But a small amount of room should be given at first, to economize the heat from below for comb-building, and after a commencement is made, additional room may be given. As the season advances, and the heat in the hive causes bees to cluster outside, shade the hive from the sun, and if forage is plenty, so that bee-robbery need not be feared, enlarge the entrance, to admit more air, and give more room for surplus honey, if needed.

After a stock has nearly filled its boxes, it will often take a long time to finish them; but few can find room to work, the others are either forced to idleness or must store

in the hive, diminishing the amount of brood cells, and thus prove almost damaging, rather than useful to the bee-keeper. This difficulty and the difficulty so often experienced in getting the bees to commence in a box after a full one is removed, besides the objection to a half finished box-honey, is overcome in the Champion hive, described in the chapter on hives.

THE HONEY EXTRACTOR.

This is a machine made to empty pure honey from the comb, leaving it uninjured, so that it can be returned to the bees to be filled again, when the operation may be repeated. The comb, from which the honey is to be emptied, is first uncapped with a long knife, and inserted in the revolving case of the machine and when one side is emptied by centrifugal force, caused by the revolving motion, the other side of the comb is emptied in like manner.

The great value of the use of this machine is only fully comprehended when we consider, first ; the saving of the comb ; second, at the time when the lime tree is in bloom, honey is secreted so fast that the bees can not stop to build comb ; in some localities the combs can be emptied every other day, before they are capped ; under such circumstances bees have gathered as much as twenty pounds of honey per day. A correspondent of the *American Bee Journal* for August and Septem-

ber, 1870, says: "We commenced removing honey July 1st, having then forty-six stocks, and have up to August 9th taken 6,162 pounds." Third; In fall, bees frequently fill the breeding part of their hive so full of honey that no room is left for the queen to deposit eggs, thereby breeding is checked, and no young bees for wintering; now by removing this honey with this machine, we not only obtain a fair supply of pure and choice honey, but it enables the queen to continue breeding.

Extracted honey should be put up in glass jars, neatly labled, in that shape it has always commanded a fair remunerative price.

HONEY BOXES FOR ANY HIVE.

To enable the bee-keeper to ascertain the condition of the contents of a box, the box should have at least one glass side; which should be so adjusted as to admit of being easily removed. Thus constructed, any comb can be removed without breaking, and without disturbing the rest of the comb by detaching the comb from the top with a knife, and if the box is inverted, the comb can be withdrawn on the knife. Large boxes are preferable to small ones, the bees can cluster better in them, and the heat is better economized for comb-building. If honey in small frames is desired, a box without a bottom, six inches deep, and nearly as large

as the top of the hive, should be used. Small frames are suspended in this, and the top closed with a movable cover ; to keep the bees constantly at work, only a part of these frames should be removed at one time, and the empty frames inserted instead, should contain pieces of nice empty comb. By the use of frames, small quantities of honey are only obtained at one time, making it necessary to open the hive often. An additional box is needed to store and protect the honey against ants, etc., after it is removed from the hive. If the small pieces of comb attached to the top of the boxes are placed crosswise of the box, and two inches apart from centre to centre, the honey will be of convenient shape for the table, and better adapted and suitable for the retail dealer. The pieces of comb for that purpose can be obtained either by trimming from the lower edge of the combs in the breeding apartment, or from below the central bar of an outside frame, the latter usually gives the nicest comb. Drone-comb is preferable, being constructed of larger sized cells, and requires less wax for comb-building, in addition to the advantages gained by removing it from the breeding apartment.

Honey may be obtained in various fancy shapes, as hearts, square blocks, circles, initials, etc., and sold to confectioners for wedding or other occasions, at enormous prices. This is done by cutting the desired shape

into a board, and attaching pieces of white comb to its highest point, after which the board is set in the box or hive instead of a frame. To remove this comb, after the honey is all capped over, without having the edge-cell broken or honey spilled over the comb, cut one side from its attachment, slightly rounding off the edge, after which return it to the bees. The bees will lick up the spilled honey, and slightly attach the comb with pure wax only; after which the other side may be cut and the edge rounded off. When this edge is cleaned by the bees, the comb can easily be removed by cutting or breaking the slight attachment. If the edges were sufficiently rounded off, no honey-cell need be broken; leaving the design in perfect shape, and the comb clean and very attractive. Initials will seldom be perfectly built by the bees, and should be cut from nice box honey, the edges rounded off, and inserted into the design cut in the board and returned to the bees for cleaning the edges, as above described. Bees will fill glass jars, if a piece of comb is attached to the top for a commencement. Honey may also be obtained in glass tumblers, by cutting a piece of nice white comb large enough to slightly crowd into the tumbler. To get such receptacles nicely filled with pure white comb and excellent honey, they should be placed upon the hive at the beginning of the honey harvest.

The adjusting of honey boxes should be carefully

performed, else some bees may be crushed. The bees are at this season most thickly clustered near the top of the hive ; to drive most of them below, puff a little smoke over them from the top of the frame, then place the front end of the box on the rear end of the frame-tops, and slowly and carefully shove it along the frame-top toward the front end, until you get it in its proper place. The bees will endeavor to get away from the gentle pressure of the box, and none will be injured. The few bees remaining on the outside of the box, can be brushed off, and the cap adjusted.

HOW TO REMOVE HONEY BOXES AND EXPEL THE BEES.

Many bee-keepers neglect to remove the honey in time, thus forcing their bees to unwilling idleness. Honey in boxes or glasses, which is all capped over except a dozen cells or more should be removed. Boxes having openings in the top may be freed from the bees, by blowing a little smoke in from above , the bees, after filling themselves with honey, will endeavor to escape from the smoke, and withdraw to the hive or box below, after which the box may be removed. Another method is to remove the cap near sunset, and raise the end of the box just enough to blow under a little smoke, when the bees will leave the holes. Timid bee-keepers may close the openings in the box bottom, by

sliding under a thin board, and the openings from the hive or lower box may be closed with another board ; or an empty box may at once be substituted for the full one. Set the full boxes right side up, on the stand in front of the hive ; elevate them with strips of wood, about one-half of an inch from the board, and five or six inches from the entrance of the hive. The smoke first blown under will have caused the bees to fill themselves with honey, and the fear of being stung need not be felt. Rap gently on the box until the bees begin to leave for the hive ; the humming of those that enter will notify the others of their position near their home, and soon all will prepare in good earnest to leave the box. Should some remain in the boxes, and the weather is pleasant, the boxes may retain that position during the night, but must be removed before the bees begin to work in the morning, or else they will at once be at work carrying the honey to the hive. If preferred, the boxes may be taken to an out-house, with an open door or window, and set on their sides ; the bees will soon leave the box and return to their hive. Should other bees scent the presence of honey, the boxes should be set in a barrel or box, and the outside bees excluded, by spreading a thin cloth over the barrel ; the bees leaving the honey-boxes, will cluster on the under side of the cloth, and if this is occasionally turned over, and the bees shook off, they will find their way to their hive. If late in the season, and the boxes

on the hive are exposed to the cool night air, by removing the cap from over them, the boxes will generally be clear of bees in the morning.

To remove tumblers, or other glass vessels, separate the edge of the glass from its attachment, with a knife, raise it up a little, and blow a little smoke in it, and after the bees have filled themselves with honey, take it away and replace it with an empty one, having a piece of comb in it, or shut up in the hole. The raspberry and white clover yields the best honey in flavor; and all nice honey in the main hive should be removed with the extractor before it is mixed with the inferior kind gathered from fall flowers. If the bees in the fall, (when forage becomes scarce,) begin to carry the honey from the boxes to the hive below, they should at once be removed. Should, however, there be a deficiency of winter stores in the hive, they should not only have the honey in the unsealed cells, but the caps should be shaved with a sharp knife from such as are sealed over, and all will be carried below.

After taking honey from the bees, it should be put in a safe place, as ants are very fond of it, and carry it off in large quantities; it should never be left where bees can get it, for they would carry it to their hive; besides it would learn them the habit of robbing.

If honey is kept on hand any length of time, it

should never be in a cellar or other damp place, but invariably in a perfectly dry room. The boxes should be kept closed perfectly tight, to prevent flies, roaches, or moths from entering.

CLASSIFICATION OF HONEY.

The vast amount of honey produced in Germany, has its own market, as much as our corn, wheat, or any other product, and is graded or classified in like manner. Honey in the comb is graded as follows :

First Class—Box honey ; comb white, free from bee-bread, and must be *nearly all* capped or sealed over.

Second Class—Same as first class, except that only about half of the cells are sealed over.

Third Class—Same as second class, with the addition of a few specks of bee-bread.

Fourth Class—Honey in brown comb, and free from bee-bread.

Fifth Class—Honey in brown comb, with more or less bee-bread.

The price, of course, varies with the class, and by far more than is usually the case in the United States. Honey of the second class is worth twenty per cent. less than honey of the first class ; and every other class still twenty per cent. less than the preceding class.

There are variations in every class, which of course vary the price accordingly.

The following directions for judging liquid honey, given by a correspondent in the *Canada Farmer*, is considered as being not far from correct :

“ I take the liberty to explain how honey should be judged ; in other words, to point out what the characteristics of good honey are, for the benefit of those who wish to compete, as well as for those who may be appointed to judge. Many times, at our county fairs, I have known the prize to be awarded to honey on account of its possessing one peculiar feature, that of being thick ; at other times on account of its being of a very light color, while little or no regard was paid to other important qualities. Honey in the comb can only be judged by its appearance, so long as it is exhibited in close boxes so that it cannot be tasted. It often happens that an inferior article of honey in the comb obtains a prize, as the prize is awarded to that which is the whitest ; but the whitest comb does not always contain the purest or lightest colored honey ; yet, as before stated, so long as honey is exhibited in close boxes, it is proper to award the prize to the whitest comb. It is, however, quite different with honey in the jar, which is open to inspection, and which, to be first class, should possess the following characteristics : light color, thickness, and pleasant

flavor. Though honey may not always possess all these qualities, yet the nearest approach thereto should be awarded the first prize. It would be very improper to award the first prize to a jar of honey on account of its light color, if another jar was of a thicker consistency, and better flavored, although considerably darker, and so of the other qualities."

BEE PASTURE.

In early spring, bees will gather bee-bread from the elm and hazel ; bee-bread and sometimes honey, from the willow, and a large amount of honey from the sugar and soft maple. The plum begins to blossom next, then peach, pear, and apple and many varieties of thorn, all yielding honey, but no fruit trees furnish more honey than apple.

When the yield from fruit trees is nearly over, the dandelion is in blossom, and will be alive with bees, gathering both bee-bread and honey.

The tulip tree, often called poplar, or white wood, produces a very large amount of dark colored honey.

The linden, or bass-wood, generally in bloom when other forage begins to fail, yields an abundance of white honey of a delicious flavor, and therefore is of great value to the bee-keeper.

The raspberry furnishes a quantity of honey, superior in flavor to any other.

The locust yields much honey, when it is most needed by the bees.

White clover is the most important source from which bees derive their supplies. Of late, it is growing along road-sides, in pastures of horses and cattle, and in many other places. It yields large quantities of very pure white honey, and in flavor is only second to raspberry.

Red clover yields its blossoms from June till October, and excels all other plants for producing honey; a single head often yielding a number of drops in a single day, and it often yields it so plentifully, that when the cups are taken between the thumb and fore-finger, it can be pressed in large drops from the lower ends of them. The flavor of the honey is equal to the white clover honey. The Italian been only, can collect the large amount of honey of red clover, the proboscis of the black bee being too short to reach the honey in its deep cups, and owing to this great advantage of the Italian bees, we are able to obtain at least double the amount of honey that would be collected by black bees.

Buckwheat blossoms yield a large quantity of honey; if gathered late in the fall, when the atmosphere is moist, or in a wet season, it is liable to sour in the

cells ; but if gathered when the atmosphere is dry, it is usually of a thick consistency.

Thousands of other honey-producing plants can be named, as, nearly all blossoms, excepting a few, producing honey or bee-bread.

OVER-STOCKING.

Many persons who keep bees, in the old or common box hives, are of opinion that there are too many bees in the country, because they can get but a small profit from their bees. As far as I can ascertain from the census returns, there is not a square mile in this country which is over-stocked with bees, unless it is so unsuitable for bee-keeping, as to make it unprofitable to keep them at all. In Germany, very frequently, apiaries having from 300 to 500 stocks of bees may be found ; and in Russia and Hungary, apiaries, numbering from 2,000 to 5,000 colonies are not unfrequent. In Silicia 201 stocks of bees are kept per square mile, and in Lombardy, (Italy,) 97,800 colonies of bees are kept, making an average of 349 colonies for every square mile ; and yet there are large profits made, no one thinking there are too many bees in the country. By comparing our bee-pasture with even the best of that in Germany, we can easily see that we can keep at least two colonies where they can keep but one. In this country, honey-producing plants are growing

everywhere undisturbed, while in Germany, nearly every foot of land is cultivated, and every weed pulled up before it is fairly sprouted.

The number of miles stocked in this country, at the rate of only one-fourth of the above per mile, are few and far between, and it is far from being over-stocked, nor is it likely that it ever will be.

Here I must remark, that by keeping the Italian bees, a larger number of colonies can be kept on one place; while the black bees can only gather from some plants, the Italian can gather from nearly all honey-producing blossoms. Further, the Italian bees range over a larger distance than the common black bees. The following proves the fact: A vessel loaded with sugar, was compelled to remain six miles from shore; on the next day it was visited by Italian bees, carrying off melted sugar, but not a single black bee was seen until the ship came within three miles of the shore. In regions where bee-forage is scarce in the vicinity, only Italian bees would prove profitable.

Mr. E. T. Sturtevant, of Ohio, in writing on the subject, says: "A kind Providence furnishes this bountiful supply each day, and if workers are not on hand to gather it on that day, it is gone. I have never known a season when this honey harvest did not enable every strong colony, in the course of a few days, to lay up an abundant supply for its own consumption,

and a generous supply for its owner. To secure this result, however, the hives must be abundantly supplied with workers. The whole secret lies in *strong swarms*. The rapidity with which swarms, at this period of the year, increase in weight, is surprising, ranging from three to five, ten to fifteen, or even eighteen pounds per day. My own bees, the last season, built combs and stored honey in their surplus boxes only from twelve to fifteen days; the shortest harvest ever known. In this short time, many of my swarms collected, in addition to an ample supply for their own consumption, from thirty to thirty five pounds surplus. The same would have been true had the number of stocks been ten times as great. I am satisfied that it makes but little difference how many strong swarms are collected together, a few days will make them all rich.

CULTIVATING HONEY-PRODUCING TREES AND PLANTS.

Able writers are constantly encouraging the cultivation of trees, and we must join with them in their effort. Nearly every farmer is at the present time fully aware that the value of his property is greatly increased by having houses and barns surrounded with groves of trees. The addition of fruit trees is still more valuable; for the production of honey none can excel the

various varieties of the cherry, and at the time of blooming they are perfectly surrounded by the bees. The various varieties of the raspberry, furnish a delicious fruit, amply paying for cultivation, besides furnishing the best of honey, blooming for nearly three weeks, during which time a large amount of honey is collected.

For shade and ornamental trees, we would recommend the hard and soft maple, locust, linden, and the chestnut. The gooseberry and currant bushes, will not only aid greatly in the ornamentation of a garden and surroundings of a house, but yield a large amount of fruit, being sufficiently hardy for almost any climate, and yield a large amount of honey ; to these may be added all the varieties of small fruit.

Buckwheat should be sown before the middle of June ; its great value for bee-pasturage, late in the season when other sources are scarce, can only be fully appreciated by actual test ; the grain alone will always prove sufficient pay for cultivating it. To induce your neighbor to sow it likewise, furnish him the necessary seed ; the additional amount of honey will fully repay you. Mr. Harbison speaks of it as follows : " When the weather is favorable the bees store honey from it very rapidly, faster at times than they can build combs to receive it. I have seen them fill pieces of old comb, laid close to the entrance of the hive, with honey, and

have known colonies to produce about fifty pounds during the continuance of the bloom on buckwheat. This is by no means an uncommon occurrence, and goes to show that this honey harvest is one of great importance to the bee-keeper. Buckwheat may be sown about a month earlier than usual, to great advantage, to furnish pasturage after the close of the clover season. It is much easier to cultivate and produce enough pasturage, in addition to that from natural sources, to supply one hundred colonies of bees, than it is to supply pasturage for one hundred head of sheep, and the profit on bees will be more than double that on sheep."

Alsike clover (*trifolium hybridum*) or Swedish clover, is equal, if not superior to buckwheat, while it possesses all of the excellent qualities of the white clover for the production of honey, is accessible to the common black bee, as well as the Italian, and as food for animals is equal to the red clover.

This variety of clover is a native of Sweden, but is now extensively cultivated in many places in this country instead of the red. It has pale red flowers, a somewhat lank stalk, and oval, obtuse leaves, which are smaller and of a lighter green than those of red clover. The flower head growing from the upper leaf joint, is globular, and formed of fragrant blossoms supported by stems. These blossoms are at first whitish and up-

right, and subsequently of a pale red, and when the flowering has past, become brown and somewhat bent. The manner of sowing and cultivation is similar to that of red clover, and being more hardy than the red clover, should be used instead, for that advantage alone; yet its great advantage for bee-pasture is an equally valuable one, and no bee-keeper should hesitate to obtain a package of seed.

CHAPTER III.

NATURAL SWARMING AND HIVING.

CAUSE OF SWARMING.

If the weather continues to be fair and pleasant in the spring, and forage is plenty, brood is generated very rapidly, and about the time apple trees begin to bloom, usually in the beginning of June, natural swarms will begin to issue, yet, when the spring is unusually favorable, swarms may be expected as early as the middle of May, and many issue about the last of that month. There is no certain rule to judge when it will take place. If you have colonies, crowded with bees, and there has been a constant yield of honey for about three weeks, and the weather is fair, you will do well to be on the lookout for swarms. Many times bees are on the point of swarming, when a few days of rainy or cold weather puts a bar to their intention, and the drones and queen-cells are destroyed, postponing

the swarming for several weeks, and frequently delaying it until the month of July, although the weather may be ever so pleasant; the destroyed queen-cells have to be re-built before swarms can issue.

The first indication of swarming is, a few are seen to leave the hive, while the bees of other colonies are busy at work. Some are seen to run out upon the alighting-board and suddenly return to the hive; others take wing, fly around the entrance for a moment, and then alight and enter again. This may continue for even an hour, but all at once a tremendous hum is set up and the bees, young and old, rush forth by the thousand, till the whole air seems to be filled with them, crossing and re-crossing each other's track till finally they all begin to concentrate near some bough or convenient clustering place; they alight and hang down in a cluster, a temporary resting place, preparatory to their longer journey to the forest. The first swarm is always accompanied by the old queen in the hive, and usually comes forth between 10 o'clock A. M. and 4 o'clock P. M., on pleasant days.

The question generally arises: "What made the bees which had toiled so long and diligently to lay up their stores in that hive, suddenly take a notion and desert it in a body, to run the risk of finding a damp, hollow tree where they might begin anew, and perhaps go over the same process?"

An able writer endeavors to answer the question in the following language: "In one or more locations, somewhat distant from the centre of the brood combs of the hive, some bee that has been engaged in nursing the young brood, from not having seen her mother, in consequence of the great multitude around her, suddenly conceives the idea that somehow or other the queen has been lost, and acting upon that conviction, she instantly sets about repairing the loss. In the course of a few hours she has prepared some bee-jelly (royal-jelly), administered the first dish and commenced to lengthen the cell downward in its proper form. One after another enters the cell and finds the royal jelly there, and the suspicion enters their heads also that the queen is lost; and here is the beginning of the process to rear another. They likewise fall into the same work with the first, and soon there is quite a cluster, which give all their attention to this young princess royal. In proportion to their care and attention their affection is given to their young mistress, and they have soon forgotten that they ever owed allegiance to another mistress than the one they are nursing. About six days elapse and she has attained her growth as a larva, and is now ready to undergo the transformation to the shape of a perfect queen; she is accordingly sealed up, and the cluster assume a position as her watchful guardians. The old queen has hitherto paid no attention to what was going on down there, in

that corner ; but to her utter dismay, as she is passing along, she suddenly comes upon this cradle of a young queen with all the paraphernalia of royalty about her. Seized with consternation and rage, she rushes at this cradle of innocence, and endeavors to tear its inmate forth to slaughter. But these nurses and guards, having a greater affection for their young mistress that they have nurtured, than for the old queen with whom they are comparatively unacquainted, demur at her uncere- monious attack, and she is hustled away. Fear, anger, sorrow and maternal sympathy for the whole colony fill her breast. This is the first mark of disrespect she has ever received. Once more she essays to destroy her rival, and once more she is uncere- moniously repulsed. She rushes away from the scene ; her anguish and dis- may are communicated to the whole swarm ; work is suspended, and when the sun has risen high enough to make it prudent, the agitated colony take in their honey-sacks what they can carry, and rush forth, queen and all that can be got to follow, glad to leave the hated precincts where disrespect and rebellion were manifested against their venerated queen and mother. A large number, however, have been left, who in the confusion did not understand fully what was up ; they are forced to put up with the rebel government that has now succeeded to power, and as they have no other alternative, put the best face they can upon the matter,

and the young queen becomes sole monarch of the hive."

The only sign of the approach of first swarming, is the presence of queen-cells. Any person can easily find them, as they are readily distinguished by their close resemblance to a pea-nut. In the movable-comb hives they can easily be found by removing one of the central combs, and carefully looking along their edges or among the clusters of bees. To find them in the common hive requires more care, or else the combs may break from their attachment. Blow some smoke from a roll of burning rags into the hive, carefully raise it up, and without jar lay it on the ground, taking care to keep the combs perpendicular, blow in more smoke to drive the bees back, raise the lower part of the hive and let the sun shine directly between the combs, keeping the bees back with the smoke. If the hive is not too deep, and queen-cells exist, they may be seen by carefully looking between the combs on the edges or near the margins of holes in the comb. If some of these cells are capped over, the swarms may be expected before long. Hives should be in readiness to receive swarms as soon as they cluster. If the rays of the sun fall directly on a cluster, they will soon disperse, and are generally lost.

TO ARREST FUGITIVE SWARMS.

Swarms of bees do not always cluster after issuing. If the bee-keeper perceives that, instead of clustering, they rise higher into the air and begin to draw off, he should at once use some means to arrest the movement. The ringing of bells, firing of guns, rattling of pans, and other "scare-out-of-home" noises, will not arrest them. How often have we seen swarm after swarm go off amidst the loudest of all imaginable noises, while just as frequently they cluster without even the presence of the bee-keeper. To throw gravel or dirt among them will often so disturb their movement as to cause them to alight. Another method for disorganizing or confusing them, "is to flash the sun's rays among them with a looking-glass." The most effectual means for arresting their movements, is to throw water over them in such a manner as to fall upon them like rain. The firing of a gun directly into the cluster, will occasionally disorganize them, and cause them to alight, but by it there is danger of killing the queen.

Bees may be induced to cluster on objects easy and convenient for hiving. It is in harmony with their instinct to cluster where other bees have chosen to alight, and by constructing objects resembling a cluster of bees, they will, quite frequently, be induced to alight thereon. Dry mullen stalks, tied to the end of a pole, and planted in the immediate vicinity of the apiary,

where it can easily be seen by the bees, usually produces the desired result. The first bee that happens to see it may take it for the cluster which is just formed by the swarm to which she belongs, (the round hulls in the stalks greatly resemble bees,) and in her eagerness to join, darts for it and lights; others follow her example before the first one discovers her mistake, still more are coming, and the swarm is clustered.

Dead bees strung on a thread, and added to the mul-len stalks would probably be of some advantage. Corn-cobs, or even a bundle of dark colored rags may be substituted. I at one time arrested a swarm of bees by throwing my black hat among them just as they were passing a tree, the hat was caught on the limbs of the tree, and in less than a minute the entire swarm was quietly clustered in the hat.

HIVING BEES.

New hives should be *cool* and *clean*. If a hive has become heated from exposure to the sun, bees will seldom if ever remain in it. All old hives should be thoroughly scoured with hot water; new box hives or gums, may be made desirable to the bees by pouring over and around the inside some boiling water in which some wax is melted; this will form a thin coat of wax over the inner surface and impart an agreeable flavor.

If the bees are clustered on a bush near the ground, sprinkle them with *cold water*, this will partly chill them, and close clustering will be the result. If possible spread a sheet directly under the cluster, and if they are to be hived in a common box hive, place a board nearly two feet square near one end of the sheet, and upon it set the hive, elevate one side about two inches, by placing a block under it; if the limb is small and not very valuable it may be cut with a sharp knife, avoiding all jarring; shake the bees upon the sheet in front of the hive, raise up the end of the sheet not occupied by the hive and gently shake the bees towards the hive which they will readily occupy. The straggling bees flying about will soon join the rest, and as soon as all are in, the hive should at once be placed where it is to remain for the season; if left on the place where hived until night, many bees will go to work and mark the spot; if changed at night many will return the next day, thus reducing the strength of the swarm. As soon as placed on the new stand they should be shaded, by placing a green bush or board over the hive.

If the bees have clustered on the limb of a fruit tree, or other bush too valuable to be cut off, take a closely braided basket or a light box, thoroughly sprinkle the bees with cold water, hold the basket or box *under* the bees and with a quick jerk shake them into it, and give them another slight sprinkling to prevent their flying;

from the basket they may be hived as directed for hiving bees from the bush.

If they alight on currant or gooseberry bushes, or in hedges ; take a small bush, fasten it in the basket, hold it mouth down, *over* the bees, and blow smoke *under* them, and soon they will ascend, quietly clustering on the bush in the basket.

If they alight on the body of a tree, or under the cornice of a house, sprinkle them well, and scrape them into a box. If they alight on the ground, the hive should be set close to them, and a few bees gently deposited near the entrance, with a spoon. The joyful hum of these, as they enter their new home, will entice others to follow, and in a short time they will take up their line of march for their new home.

To hive a swarm of bees in the movable-comb hive; remove the entrance-regulating slides, have all the frames in the hives, honey boxes on, and the openings between the main hive and honey boxes closed; if in the Champion hive, by having the second story removed and roof placed on the lower part, set the hive snug on the sheet to prevent the bees from getting under it, and hive the bees as directed for hiving into the common hive.

Bees may be quickly hived into the side-opening Champion hive. Remove the cap and movable side,

lean the hive against the cap, the open side up, have the frames in place, and shake the bees directly into the hive, slide in the side and the hiving is done. The bees flying about the hive, will soon join the rest, through the entrance; adjust the cap and carry them to the stand they are to occupy; open the ventilating holes and the common entrance, by removing the slides. By thus hiving bees in less than one-fourth the time usually required, the difficulty of two or more swarms uniting together, should they come out at short intervals, is to a great extent overcome. Dispatch in hiving is important, as the bees become more difficult to handle the longer they are out of the hive; besides, in large apiaries, where natural swarming is practiced, the services of the bee-keeper are frequently needed at several places at the same time.

SWARMS PREVENTED FROM CLUSTERING TOGETHER.

During the height of the swarming season and if the weather is favorable, it frequently occurs that another swarm comes out before the first one is hived. As soon as the bee-keeper perceives another swarm in the act of swarming, before the operation of hiving the one with which he is engaged is completed, he should at once sprinkle some water on them, and cover them with a sheet; then turn his attention to new swarm. To

guard against more swarms coming forth before these are hived, blow a little smoke in each hive, which will slightly disturb them and give time for hiving before others issue. The new swarm must now be hived as quickly as possible, and if no other swarms have started, return to the first swarm, remove the sheet, and finish the hiving, the flying bees will join their respective swarms at the hive. If, however, two swarms should start together, they will usually unite on the wing and cluster together, and separating them is the next operation. If from want of inclination or time the bee-keeper does not desire to undertake this tedious job, they may be hived together, and if hived in a movable-comb hive, instead of closing the communication between the main hive and the honey boxes, they should be allowed to enter both at once. If hived together, one of the queens will be killed, and before winter the united swarm will not be stronger than each would have been if separated, although the amount of honey stored by such a double swarm is usually fifty per cent. more than obtained by a single swarm. At the present price of bees it would pay well to separate them; this may be done at the end of the week, if a movable-comb hive is used, by following the directions for making artificial swarms. If no movable-comb hive is used, they should be separated before hiving them.

SEPARATING SWARMS THAT HAVE CLUSTERED TOGETHER.

A simple, yet not always reliable, method, is to hive them together into a long box, having a leafy bough fastened in a corner of each end; by setting the box in an inverted position over night, in a shady place, they will occasionally separate, each occupying one of the boughs; which may then be removed and the bees hived. Four swarms, having united while swarming, were at one time hived together in a large dry goods box, with a leafy bough in each corner. During the night the swarms separated, each occupying one bough in the morning.

If we could obtain the queens of those swarms uniting in the act of swarming, the bees could be easily divided. To find the queen, spread a long sheet on the ground, and on each end set a hive; the sheet should be white, and at least seven feet long. Shake the bees upon the sheet, at an equal distance from each hive; to prevent their flying and quick movements, sprinkle them slightly with cold water. The object is not to wet them, but to partly chill them, and consequently but little water should be used.

Take a spoon and scatter the bees towards each hive, until they are marching in each direction; look carefully for the queens along the thin and scattered column of bees, especially near the entrance of one of the

hives, while an assistant keeps a watchful eye near the other. If both queens are seen to start for one hive, seize one by the wings, and give it to the opposite hive; divide the bees about equally between both hives, and remove them to their stand. If but one queen is seen, catch and confine her, until needed, in a glass tumbler covered with a thin cloth, to admit air; divide the bees equally, and watch the hives for a few minutes, until you ascertain from the movements of the bees which hive is queenless; if, in a few minutes, the bees begin to run around and over the hive, especially around the entrance, while others are more quiet, you may be assured that they are searching for their queen. Present her to them, at the entrance, when she will be joyfully received, and the bees will at once become quiet.

If the bees all enter the hives and neither of the queens be seen, set the hives a rod or more apart, and watch the movements of the bees for a few minutes; if both remain equally quiet, you may be assured that each has a queen. But if either of them show signs of being queenless, confine the bees to the hive, admitting air; if in the common box hive or gum, tie a thin cloth over the mouth, and lay it on the side to admit air. Then take the other hive and shake the bees a second time on the sheet, and proceed as before; if you find one queen, seize her and give her to the confined swarm; set both hives on their intended stand, and open the entrance.

The operation of separating swarms is very tedious, compared with the manner of separating them in a movable-comb hive ; that is, separating them by making a nucleus swarm. (See Nucleus Swarming.)

TO PREVENT SWARMS FROM LEAVING THEIR HIVES.

It is a frequent occurrence that natural swarms, after being hived, do not like to remain in the hive, but come forth like a swarm a second, time and are usually lost. This is occasionally caused by not having the queen with them ; in such cases the bees will cluster wherever the queen may be, and the operation of hiving will have to be performed a second time. In making artificial swarms, difficulties like the above are never experienced, as the young swarm, from the first, have combs and brood, and are at once "set to house-keeping ;" and if the improved system of nucleus swarming is practiced, they have, in addition to comb and brood, a young and fruitful queen, accustomed to the hive before the final swarming is performed.

If the bees, which show signs of unwillingness to stay, are in a common hive, confine them to the hive, admitting air, carry them to a cool and dark cellar or out-house, provide them with honey diluted with water or thin sugar syrup ; this can be done best by the use of the Combined Feeder and Ventilator. After three

days they will have built some comb, in which the queen will have deposited her eggs, which they will not leave, and may then be set on their stand.

If the bees are hived in a movable-comb hive, they can be left on the stand, and the departure for the forest prevented by furnishing them with a comb containing unsealed brood and honey; this will enable the queen to deposit her eggs in the comb at once, and to make up the amount of bees that are lost, before the bees from the newly built combs are hatched, go to any stock of bees that can spare a comb, containing brood and honey, draw out a comb, brush *all* the bees back into the hive with a feather, look over the comb, and if it contains neither queen nor *queen-cell*, place it in the hive containing the young swarm. This will greatly encourage the bees, and the honey in the comb will furnish them the necessary food, should bad weather prevent them from obtaining it abroad.

HATCHING AND MATING OF THE YOUNG QUEENS.

When queen-cells are constructed preparatory to swarming, (usually several,) often as many as thirteen are constructed by the workers, probably to make the work sure, at intervals of one day. In about eight days after a swarm has left a hive, the queen of the first constructed queen-cell will be matured and emerge. As

soon as she leaves the cell and surveys the comb, she rushes towards the next queen-cell, and if not prevented by the workers, bites open the cell from the side and kills the inmate with her sting ; in like manner she rushes to the next queen-cell, and if the workers present do not resist her, opens the cell and kills the young queen in its "cradle of innocence," often before she herself has been out of her cell longer than a minute. If she is successful in destroying her rivals, no second or after-swarms will issue. This young queen, to become competent to lay both drones and worker-bees-producing eggs, must meet the drones, which usually occurs on the third day, if the weather is pleasant. According to Huber she must meet the drones before she is twenty days old, or she cannot be impregnated. On the third day after impregnation, she begins to lay eggs, and the workers now treat her as their queen and mother, the hive having been without a fertile queen since swarming ; the workers being well aware that on this young queen depends the further existence of the colony.

AFTER-SWARMS OR CASTS.

If, after swarming the first time for that season, the weather is favorable, forage in abundance, and the bees remaining after first swarming are of sufficient strength or inclination to resist the first hatched queen in the

act of destroying the young queens in the cells, after-swarms, often called casts, may be expected. Her attempts to destroy her rivals will continue frequently for sixteen hours, and in her anger she utters a sound similar to the peeping of a young turkey. If the bee-keeper approaches the hive in the evening, when all surrounding noises have ceased, and carefully places his ear against the hive, this noise may be heard distinctly, if the hive contains what some call "a peeping queen." If this sound is heard, a swarm may be expected the next day; as the queen, failing in her intended destruction of her rivals, rushes from the hive, accompanied by a portion of the worker-bees. Second swarms usually issue on the ninth day after first swarming, often regardless of the state of the weather. While an old queen of a first swarm can never be induced to leave the hive with a swarm unless the weather is favorable, young queens of after-swarms often issue even when slightly raining, and usually go further before they alight, and are generally lost, unless seen in the act of swarming; their cluster being usually small and not easily found.

If, after the issue of a second swarm, more than one occupied queen-cell remains in the hive, and enough workers are left behind to resist the queen next hatched in her attempt to destroy the other cells, the peeping can again be heard, usually on the evening

morning after the second swarm has issued, and a third swarm may be expected the next day. Fourth and Fifth swarms are cast under like circumstances, usually at intervals of one day. If, however, no peeping is heard after the lapse of twelve days after the issue of the first swarm, no after-swarms need be expected.

If the season is favorable, forage abundant, and the second swarm early, they usually fill their hive, or obtain sufficient food for winter. All swarms issuing after a second swarm are usually of little value even in favorable seasons, besides greatly weakening the old stock, laying it bare for destruction by robber-bees or the moth. One swarm from each stock per year is the safest and most profitable rate of increasing stock, and all after-swarms should be prevented from issuing. It is easily and effectually accomplished in the movable-comb hive, by opening it in about five days after the first swarm has issued, and after removing the combs from the hive, cut from the combs all queen-cells *except the most perfect one*, and return them to the hive; great care must be exercised in handling the comb containing the remaining queen-cell, for if slightly touched against the next comb the inmate may be injured or killed. In due time the remaining queen in the cell will emerge as queen of that hive, and no more swarms will issue; by this easy and simple operation, we may

keep all our colonies strong and well prepared to guard against the robbers and the moth.

LOSS OF THE QUEEN.

The queen-bee is frequently lost by accident or deformity, and unless remedied in time, causes the loss of the entire colony, as is well known by many bee-keepers. In swarming time the queen is occasionally lost, if her wings are naturally too imperfect, or from some accident her once perfect wings have been so injured as to make it impossible for her to fly with the swarm ; in which case she falls into the grass or weeds, and if the bees do not find her, to cluster with her, she is usually lost ; the bees may cluster on some branch for a few minutes, but will eventually go back to the parent hive. Most queens, however, are lost while out to meet the drones ; some are born with wings so imperfect that they cannot return to their hives ; others are caught by birds, or are dashed by high winds against hard objects. The larger portion, however, are lost in attempting to return to their hive ; although she seems to mark the hive and locality, by flying with head towards it for several minutes before rising high into the air, yet the young queen frequently fails to recognize the exact hive, and while attempting to enter the wrong hive, mistaking it for her own, is killed by the entrance-guarding workers. Such mistakes occur where the

hives are of equal size, shape and color, crowded close to each other and all facing in one direction. To avoid this the hives should be of various colors, and not crowded side by side ; or have some distinguishable objects in front of them—trees or bushes answering a good purpose, which will enable the queen to mark the position and appearance of her habitation. Queens lost in this manner, if from a second or after-swarm, or from a stock from which a swarm has left, is always a serious loss, as the brood in the stock is too far advanced to raise a queen to repair their loss, and after-swarms are entirely without brood.

When the loss of the queen is ascertained by the workers, their agitation will soon give evidence of the fact. The bees rush from one part of the hive to another ; out of their hive and back again ; running about the entrance in great haste, and up and down on the sides of the hive as if in search of something lost. This commotion is noticeable for about three days usually in the morning when other colonies are quiet. After becoming fully satisfied of their loss, they settle down quietly, and sometimes begin to work, yet there is a dissatisfied appearance noticeable ; when returning from the field, instead of entering in haste as usual, they are slow in their movements, lingering on the alighting board as if in a quandary whether to enter or not ; the drones are tolerated while other colonies have killed or excluded them ; the number of bees are re-

duced by continual losses, and if the proper remedy is not applied by the bee-keeper, the existence of such a colony will soon be ended by robber-bees or the moths.

All colonies that have swarmed, and all after-swarms should be occasionally looked at for about two weeks after swarming, and if any colony shows signs of being queenless the proper remedies should be applied at once. To Huber's discoveries we owe the great step made in the successful management of bees. When he discovered and satisfactorily proved the fact *that bees could raise a queen from any worker egg, or young larva in the hive, by altering the shape and position of the cell, and feeding the young bee on a different kind of food; and that bees when they become queenless from any cause, have received the instinct to proceed instantly to supply her loss, by rearing a new queen from worker eggs or very young larvæ in worker-cells in the hive.*

If the swarms in moveable-comb hives are provided with combs containing brood, as above described, the loss of the queen will be remedied by the workers without any addition from the bee-keeper; but swarms in the common box hive or gum must be provided with brood, or, if possible, with a perfect queen-cell. To obtain a queen-cell, go to any stock that has cast a swarm not over six days previous, proceed as described for examining for queen-cells, and with a sharp knife cut out a *piece of comb* containing a *sealed or capped*

queen-cell, take it to the queenless swarm, driving the bees back with smoke ; near the middle cut out a piece of comb, in size and shape like the piece containing the queen-cell, insert it instead, and carefully return the hive to its stand. In handling the piece of comb containing the queen-cell, great care should be observed not to press the cell, either while inserting or after it is in the hive ; if any comb should crowd the cell it should be cut away. If a queen-cell cannot be obtained, a piece of comb containing eggs and larvæ, in worker-cells, should be inserted in the middle of the cluster of bees ; or take a strip of comb, containing eggs, cut it to one inch wide, and slightly press it between two brood combs in the queenless colony, the mouth of the cells up and down in the hive.

By the use of the movable-comb hive the change of brood or queen-cell is more easily effected, by taking from any other hive a frame containing eggs in worker-comb, and exchanging it with a frame from the centre of the queenless stock. If a queen-cell is to be inserted, put it in the central frame ; but if the frame from which the queen is to be cut, contains but one cell, it may be exchanged, as in furnishing comb with eggs. Whether or not a colony is queenless, can be ascertained with certainty, as, by the use of the movable-comb arrangement, the condition of the colony may be known at any time by actual examination of every comb in the

hive. If in three weeks after swarming, brood cannot be found in the middle combs, the stock is *probably* queenless.

Queens are also lost by accident, they being frequently crushed in handling combs of hives which admit of sliding the combs close to each other, or, while lifting them out at the top, without leaving the necessary space between the combs. In hives of single thickness, standing out on their summer stand, without additional protection, it occasionally happens, that, even if none of the colony freeze, the queen becomes chilled, so as to destroy her fertility; a similar result follows if a queen is subjected to starvation for two days, although in such a case the queen is present in the hive, a stock containing such a queen, will soon share the disaster of a queenless colony, there being no young bees to replenish, and consequently the stock dwindles down to nothing.

Queens also die of old age, when from four to five years old. As soon as the fertility of the old queen begins to fail, the workers usually supercede her by raising another; yet if her loss should occur at a time when no brood is found in hive, or there are no drones to impregnate the young queen—should they succeed in raising one—such colonies will evidently become queenless.

If a stock of bees in the spring does not carry large

and plump pellets of bee-bread, while other colonies are very industrious, the bee-keeper may reasonably suspect that that colony is queenless. Examine the litter on the bottom board or in front of the entrance for eggs or a few immature bees, if either are found it shows that the hive has a fertile queen; if, however, neither eggs nor imperfect bees are found, and the bees are in the common hive, turn it upside down and look between the combs for brood; if not seen at first, drive the bees back with smoke and break out a piece of comb from near the *centre* of the hive, and if it contains brood in worker-cells, the suspicion that the colony is queenless can be at once dismissed; be sure, however, that the brood is that of a fertile queen instead of a fertile worker. (See "Brood.")

If the loss of the queen is detected either in early spring or late in the fall, when no drones are present, and a fertile queen cannot be given them, it would be useless to provide them with brood to rear a queen, as such a queen could not be fecundated, and would remain barren. To save the bees, unite them with another colony, and preserve the combs. (See "Combs.")

HOW TO UNITE TWO OR MORE COLONIES OR SWARMS.

A large cluster of bees is able to maintain the proper degree of warmth in cold weather, better than when

divided into two or more small elusters, and the consumption of food is less. If, during the scarcity of forage, weak colonies are found in the apiary, they usually fall a prey to robber bees; such colonies must either be strengthened by helping them with comb, brood or honey, taken from strong colonies that can spare it, or two of them may be joined together. To prevent their quarreling after being united, it is necessary to impart to all an equal scent. If the bees which are to be united are both weak *swarms*, shake them together on a sheet, and sprinkle them with sweetened water containing a few drops of essence of pepermint, and hive them together. Swarms coming out on the same day, may be successfully united without scenting. After-swarms are occasionally accompanied by several young bees, espacially the third swarm. Such a swarm should be hived by itself and set next to the one with which it is to be united. During the night all queens but one will be killed. Near sundown of the next day, set the swarm which came out first on a sheet, and raise the edge of the hive so that the other swarm may enter; then shake the bees from the other hive on the sheet, and while the bees are entering look for the queen; if seen she must be taken away, for if allowed to enter, a combat will occur between the queens; and if the queen of the first swarm has become fertile, she usually falls a victim, and the bee-keeper must run the risk of losing the other queen while out to meet the

drones. Full stocks, having lost their queen, must be driven from their combs. (See "Artificial Swarming.") Sprinkle the other stock, to which they are added, with sweetened and scented water in their hive, and set them on a sheet; the other bees may now be sprinkled likewise, and shaken on the sheet in front of the other hive, which they will readily enter. If the bees are in a movable-comb hive, two weak colonies may be united without shaking the bees from their combs. Induce them to fill themselves with honey from their stores, by blowing a little smoke into each hive, then place the combs with the adhering bees into one hive, If there are more combs than one hive can receive, only insert those combs containing the most honey, if in autumn—or those containing the most brood, if in spring. If a queenless colony is added to a full swarm, drive the bees from their combs (See ("Driving or forced swarming,")sprinkle them with cold water and shake them on a sheet directly in front of the hive with which they are to be united. If they were thoroughly agitated whilst driving, they will remain wherever placed like a natural swarm. Another method is to close the hive and remove it to a cool and dark cellar or room, admitting air and providing water until near sundown of the third day, when the hive may be set on its stand and the entrance opened.

CHAPTER I V.

ARTIFICIAL SWARMING.

ADVANTAGES OF, AND OBSERVABLE RULES FOR ARTIFICIAL SWARMING.

That artificial swarming is a surer and safer method to increase stocks, (if properly practiced,) than to rely on the uncertainties or natural swarming, is now a settled fact among all bee-keepers, and the necessity was felt centuries ago. Although not known to all even at the present time, it has been practiced with more or less success for nearly a century. Huber, after his invention of the sectional bee hive, seems to have practiced it. Dr. Scudamore, in writing on the advantages derived from artificial swarming, and the disadvantages and difficulties attending natural swarming, makes the following observations :

“There is no certainty of the time when natural swarming will take place, by reason of several causes, some of which may (and probably will,) prevent it al-

together, and the inconvenience to which the proprietors are liable, who do not form artificial swarms, are consequently many. First, they are obliged *to watch* the departure of swarms very assiduously for six weeks, sometimes much longer. Whatever attention may be paid by persons entrusted with this care, many swarms fly away, which it is impossible to arrest.

“It has been calculated by a great bee-keeper that a fourth part of the best swarms are usually lost in this manner. Secondly: He who has a small number of hives, is obliged to watch them with the same assiduity as if he has more; and he who has a greater number is often much embarrassed, because it is no unusual thing to see several swarms go off at the same instant; some escape on one side and some on another, or unite themselves together. Thirdly: A cold and rainy time, which may, and often does happen at the moment when swarms are disposed to come forth, often prevents the bees from swarming.

“And further, swarms may issue at times when one wishes to be otherwise engaged; and on the other hand, although the proprietor may be present, his swarms may choose to settle on places where it is difficult to hive them.

“Now, it is easy to imagine, and still worse to experience, some of these difficulties. If swarms always issued regularly, all would be well, and it would be un-

necessary to interfere, or in anywise to anticipate the gratifying spectacle of a natural swarm. But the vicissitudes of our climate are so frequent, ever varying and changing still ; so sudden and sometimes so extraordinary ; smiling now and frowning again ; aye, as coquettish and uncertain as the youthful maiden, that the bee-master, in trusting to the process of nature, more frequently finds his best wishes annihilated and the golden hours of spring dwindled and frittered away ere his swarms come forth."

The convenience and saving of time to the bee-keeper is another important item in favor of artificial swarming ; by the aid of the movable-comb hive an artificial swarm can be made in five minutes, and by devoting the mid-day hours for a few days to this work, a hundred colonies may be swarmed, without help and without interfering with the usual labors of the day.

Success depends on the following conditions and rules, which must be strictly observed, or the attempt may result in failure :

1st. A stock should never be divided until it has become strong in population. If the strength of a colony is crippled by a division, before the colony could spare a sufficient number of bees to make a proper swarm, neither portion would be able to generate sufficient heat for breeding or comb-building ; while on the other hand if it is left until it can spare a swarm, both

divisions would readily fill their hives, lay up a sufficient amount of honey for their winter food, and give a good profit in surplus honey to their owner. Should the season prove a poor one, after swarming, weak swarms will usually be deficient in population and winter stores, and the loss of both colonies will be the usual result; whereas, strong stocks will usually succeed in filling their hives and obtaining their winter stores. Should any stock be too weak to be divided at the proper time for swarming, it should not be swarmed that season. From such non-swarming stocks—if they become strong—a large amount of surplus honey is usually obtained. To be sure that your bees may prosper even in the poorest season, keep *strong* stocks and them *only*.

2d. *The proper time* is to be taken into consideration. About the time natural swarming begins, artificial swarms are made most successfully. If honey is obtained by the bees in abundance, and drones exist, either flying or in the hive, swarms may be made earlier. Never delay it until it is so late in the season that the bees will not have time to fill their hive, become rich in honey for their winter feed and strong in population before forage is all destroyed by the frost. Beginners should regard the issuing of natural swarms, or the first blooming of the apple-trees as an indication of the proper time; if, however, a capped queen-cell or a fertile queen can be given to the new swarm,

a variation of a week or ten days may be made from the usual time.

After the bee-keeper has obtained knowledge from experience, and the season is favorable, strong stocks may be swarmed successfully until the beginning of August ; in such cases buckwheat should be sown early, in order to produce a rich fall pasturage.

3d. *The method employed* in artificial swarming is of no little consequence ; whether in harmony with or in violation of the nature of the bees. The success in providing the queenless part with a *fertile* queen, and the time required, forms the principal part of the value of *any* method. Various methods are known, applicable under various circumstances of time, conditions of hive and colony, and inclinations and desires of the bee-keeper. A few of the most practical methods of forming artificial swarms, under various circumstances, will be described. Always swarm the strongest colony first.

Before swarming, a number of queens should be raised to supply all artificial swarms as soon as they are formed ; if the first stock is to be divided on the first of June, queen cells have to be started, by caging or removing the queen, (see Queen Raising,) on the tenth of May ; or if the artificial colonies are to be provided with an embryo queen, in a queen-cell, then these cells are to be started ten days before you desire

to swarm your bees. In no case should you compel a colony of bees, which do not have their hive filled with comb, to raise a queen from brood given to them; as a queenless colony that is building comb, will only build drone-comb of irregular thickness for the storing of honey. In such combs no eggs can be deposited by the queen; the breeding room is consequently diminished, and weak colonies the result.

DRIVING BEES, OR FORCED SWARMING.

Although forming swarms by the driving system cannot be recommended as the best, as the reader will be enabled to judge when comparing it with the other methods described—I shall give the particulars, as they embody the directions to be observed in driving the bees from the common hive before transferring the colony to the movable-comb hive; besides, it is the only method of making an artificial swarm from the common hive. The main principle in this method is to drive out a portion of the bees with the queen, to form the new swarm, leaving those bees which are absent while the stock is forced, and the remaining young bees in the old hive, to rear a queen from the worker-brood. (See Huber's discourses under the head of "Loss of Queen.")

For driving bees, choose that time of day when a large number of them are absent gathering forage.

Select a strong stock, and if any of the bees are hanging on the outside, sprinkle them slightly with cold water and they will run into the hive; puff a breath of smoke into the hive, lift it gently from the stand, carry it off two or three rods and set it down with the mouth upwards; take care not to give it the slightest jar, and the bees will not be much inclined to resent the operation. Have a "driving box" ready, which may be a half bushel measure, a box the size of the hive, or an empty hive containing some cross-sticks on which the bees may cluster; place it upon the old hive, mouths or openings together, so that both may fit closely; take a sheet, fold it lengthwise two or three times, and tie it around where the two hives join, stopping all the crevices so that the bees cannot escape. Give the old hive a few smart raps with the palms of your hands, or some small sticks, so as to thoroughly arouse the bees. They will become alarmed, and instantly commence filling themselves with honey. While they are filling themselves, take an empty hive, as much like the old one as possible, and set it upon the old stand to catch the returning bees, otherwise they would go to some neighboring stock. Return to the confined stock and continue to rap around the lower hive for about twenty-five or thirty minutes; the loud buzzing and humming is an indication of the upward movement of the bees. After rapping during the time above mentioned, the upper box may be slightly raised for examination. If

the upper box contains two large holes, opposite each other, covered with wire-cloth or glass and darkened while rapping, examinations may be made from time to time, without separating the driving-box from the hive, thus making the escape of bees impossible. If there are not enough bees in the upper box, the rapping will have to be continued a little longer. As soon as the bees have ascended into the upper box and are hanging like a swarm, take off the sheet and spread it on the ground; lay a few sticks of wood upon it, and then upon them place the box containing the bees, mouth down; the sticks should be of sufficient size to elevate the box so as to admit air. Take the hive from which the bees were *drummed*, and set it for a few minutes on the old stand. The bees in the new hive, sitting there to receive the returning ones, may be shaken near the entrance of the old hive, and when all have entered, take the old hive and set it on a new stand, where it is to remain for the season. Stop all the crevices where bees can enter, except one, just large enough for one or two bees to enter at a time; this is done to prevent other stocks of bees from taking advantage of their weakened condition and robbing them.

You should now return to the swarm in the box, and were you sure it contained their queen, it might be hived at once; watch the bees a few minutes, and if they show signs of disquietude, running around and

over the box, it is presumable that the queen is not with them. The presence of the queen may also be ascertained, by placing under the box a piece of *black* paper or black oil-cloth ; after a few minutes, examine it for eggs, which the queen is compelled to drop for want of comb in which to deposit them. If the bees remain quiet, although no eggs are seen, it is reliable evidence that the queen is with them. We may now proceed to hive them ; if they are to be hived in the movable-comb hive, prepare it by inserting a comb from another stock, etc., as directed for hiving a natural swarm ; set the hive on one end of the sheet and shake the bees from the box on the sheet about two feet from the entrance of the hive ; with a feather or spoon scatter the bees towards the hive ; the hum of those first entering will attract the others, and they will begin to follow them. Watch near the entrance for the queen ; she will usually be seen among the old bees, who outstrip the younger ones in their march for the hive. When all but a quart have entered, take the sheet with the bees to the old hive, and if the queen has not been seen, make them travel in a thin column to the hive, still watching for the queen, which may be among them ; if seen, seize her by the wings—never by the abdomen, as that may destroy her fertility—and carry her to the forced swarm. The young bees will remain in whatever hive they are placed ; many of the old ones, however, will return to their old stand, and

without these young bees the brood in the old stock would perish for want of nursing bees. As soon as the hiving is done, place the forced swarm on the stand where the old stock stood before driving.

If this driving operation is performed on a pleasant, warm day, we usually get the queen with bees, but if the motions of the bees indicate that she is not with them, additional rapping, if performed thoroughly at first, will not induce her to leave the combs ; in such a case the new swarm must have a queen given them, or they must be returned to the old stock, and the hive set back on its former stand ; in a few days the process may be repeated. Although the new swarm, if hived in a movable-comb hive and provided with brood in comb, would raise a queen, all comb built before the young queen becomes fertile, would be drone comb, constructed to receive their honey harvest.

If the stock from which a swarm has been driven is left without any interference by the bee-keeper, the bees will rear a queen from the brood in the hive, and at least twenty days will elapse before the young queen becomes fertile. If, however, a queen-cell from a previously divided stock can be given them, the young queen will hatch in about five or six days, thus gaining several days time. If the bees were driven about noon, insert the queen-cell about sundown, as, after that lapse of time the queen-cell is less liable to be destroyed.

HOW TO DIVIDE A COLONY, MAKING TWO FROM ONE.

The method here described will be especially adapted to the formation of artificial swarms at one operation, when the bees are away from home, and when a number of queen-cells are to be started for other swarms, to be formed subsequently. Remove a strong colony a rod or more from the old stand; if carried under the shade of a tree, the operation is more conveniently performed. Subdue the bees with smoke, and while they are filling themselves with honey, set an empty hive on the stand to receive the bees returning from the field, take another hive to the colony carried away, and blow more smoke on the bees, remove the frames from the new hive, open the stock of bees, take out one comb, and, with a feather from the wing of a goose or turkey, brush *all* the bees back into the old hive, and put this comb into the new hive. In this manner remove five combs from the old, and insert them in the new hive, fill up both hives with empty frames, close the upward passages with the honey boxes until the hives are filled, put on the caps, and set the new hive on the old stand for the flying bees to enter, shake the bees from the *empty* hive near the entrance of the new one, and as soon as they have entered, set the old hive on either side of the new one. Many of the bees, on coming from the field, will return to their old

stand, thus populating the new hive, while about one-half will return and remain with the queen in the old hive. By this method we are sure that the new colony is queenless, and, if it is not intended that it should raise a supply of queen-cells, a capped-over queen-cell should be inserted about six hours after forming the swarm. If this division is made a few days before swarming, queen-cells will be found on some of the combs; and the comb containing the most advanced cell, should be given to the new hive, and all other cells clipped out with a small knife. If the two hives differ in appearance, the old stock or hive should be partly disguised by spreading a cloth over it, or else it would be recognized by the bees and receive the largest portion of them. If there should be a difference in the number of bees in each hive, move the stronger a few feet from the other, or if the difference is large, remove the strong colony to a new stand a short distance away, and set the other about midway between the old and new stands.

TO MAKE THREE COLONIES FROM TWO.

This method is very simple, and generally most successful, and should be practised by beginners and all persons who desire a large amount of honey with a moderate increase of colonies. It is impossible to get both a large amount of honey and a large increase of

swarms, in the same season, without great skill in management.

On a pleasant day, when most of the bees are abroad, take the new hive to a strong colony, remove from the latter five frames, and brush *all* the bees *back* into the hive ; put these combs into the new hive, and fill up both hives with empty frames ; remove another strong stock (in any kind of hive) to a new stand, and set the new hive where it stood. In this manner, one colony furnishes the combs, while another colony furnishes the bees for a third swarm ; many of the bees belonging to the colony removed to a new stand, will return to their old stand, and provide the new hive with the necessary population. The directions given in the dividing method for providing a queen for the new swarm is applicable here, as well as in the following method :

ANOTHER METHOD OF FORMING ARTIFICIAL SWARMS.

In forming swarms upon this method, at least five moderately strong swarms are required, four of which must be in movable-comb hives, and it must be performed when most of the bees are abroad. Select four stocks, take two combs from each, brushing all the bees back into their hives, or else the queens may be removed ; insert two empty frames in each hive to fill the vacancies, placing them near the middle, with a

full frame between. Insert the eight removed combs in a new hive; remove a fifth strong stock to a new stand, and set the hive containing the comb in its place; the bees returning to their old stand, furnish sufficient population to protect the brood.

By this method, no stock loses more than two combs at one time, and if the weather is favorable and forage abundant, the loss is soon regained, so that a new swarm can be made from the same four stocks as soon as the empty frames are filled; and even if frost should cut short all pasturage, the new swarm is never too small or the old stocks too much reduced to be in good condition for wintering.

The date of the division should be carefully noted, and those colonies raising queen-cells opened on the tenth day, at which time the queen-cells will be capped,—and all but *one* must be removed; the cells may be inserted in the combs of other stocks or destroyed. Fifteen days later, make another examination to ascertain whether or not each swarm has secured a *fertile* queen. Look carefully for eggs in the cells, and if no eggs can be seen by this time, it is generally certain that the colony is queenless, and it should be treated as such. The combs inserted in a new hive, when making the swarm, should be placed together, the brood-comb in the middle, and the combs containing the least or no brood, nearest the outside, and next

to them the empty frames ; this will enable the bees to cover the brood and prevent it from chilling. Guard the queenless swarms, as well as those removed to a new stand, against robber-bees for a few days ; also retain the heat in the hive for breeding, by diminishing the size of the entrance so as to admit no more than two bees at one time. In all the above named methods, every new swarm undergoes the risk of losing their young queen while out to meet the drones, and many may be found queenless, when the examination for eggs is made ; besides, the best honey-gathering season passes while the bees are rearing a queen, during which time but little honey will be gathered, and unless a fertile queen can be had at the time of swarming, much honey is lost that might otherwise be obtained.

NUCLEUS SWARMING.

This system of swarming differs materially from any yet described. We first rear a queen in a small cluster of bees, called nucleus, from which the system derives its name. The queen is matured and fertilized before the final swarming is performed, hence there are no queenless parts ; the labor of the hive is carried on with the zealous rapidity only observable where the presence of a fertile queen inspires industry and prosperity, and the nectar of the flowers is stored in suffi-

cient quantities to pay the bee-keeper for the proper management bestowed on them.

The principle of this swarming is based on the following facts ; “ 1st. That a very few bees, barely sufficient to produce, under the necessary protection, the requisite heat for breeding, *can and will raise a queen from worker eggs or young larvae.* 2d. That it is the habit and instinct of bees to return to their old stand.”

Early in the spring, as soon as drone-brood can be found in any hive in the apiary, open a strong stock, draw a comb or two from near the centre of the hive, select the one containing eggs, larvæ, and capped brood, and look carefully over it ; if the queen is not upon it place it (bees and all,) in a new hive, move it close to one side, and next to it place a comb containing honey to furnish the food for bees ; to protect the bees and brood more thoroughly, have ready a board cut to fit the bottom and the front and the rear of the hive, and in height, even with the frame top ; insert it next to the combs. In addition to the bees taken with the combs, brush in the bees from one or two more combs, taking care not to remove the queen from her hive. As many old bees will return to their old habitation, at least a quart of bees should be brushed into this new hive, which is now called a nucleus hive. Set the nucleus hive on a new stand, which should be at least two rods distant from the one from which the

bees were taken ; retain the heat and guard against robber bees, by diminishing the size of the entrance, so as to admit but one bee at a time.

Return to the old hive, and insert two empty frames in place of the combs removed ; if these frames are placed near the middle of the hive with a full frame between, combs will be built in them almost immediately, and filled with the eggs of the queen as fast as built. Thus the bees will increase more rapidly than ever, and instead of hanging around the entrance of the hive in idleness the removal of the bees and comb gives room for them to work, inducing new zeal and activity.

Ten days later, capped queen-cells will be found in the nucleus hive ; open it and see how many perfect queen-cells it contains ; if more than one exists, return the comb, and from another strong stock form a nucleus hive in the manner directed. Return to the first nucleus, and with a small knife cut out one queen-cell ; separate with the cell a piece of comb, at least one inch square, return the frame from which the cell is cut to its place ; cut a hole in the brood comb of the new nucleus near the middle, of sufficient size to receive the piece of comb and adhering queen-cell, and in this hole insert the queen-cell in such a manner that when the comb is placed in the hive, the queen-cell will be in its original position, (point down) ; trim the comb a

little near the point of the queen-cell, so that the queen may not be obstructed when emerging at the point. In transferring a queen-cell, great care should be taken not to expose it long to the rays of the sun or to the cool air, or to any pressure that may destroy its inmate. After the cell is adjusted, the place where the piece of comb containing it joins the brood comb may be pinched a little to retain it in position, and the bees will do the rest; close the hive, diminish the entrance, and set the nucleus on a new stand two or three rods from the parent stock. In this manner form more nuclæ until all the queen-cells *except one* are transferred; then go to the stock from which the first nucleus was formed, select a comb containing eggs and sealed brood, brush back *all* the bees and insert it next to the comb containing the queen-cell. This is done, not only to strengthen the nucleus, but to induce the bees, which might otherwise leave the nucleus hive at the time the queen comes forth to meet the drones, to remain with the *unsealed brood* raised from the eggs in that comb. Should the queen, while out to meet the drones, be lost, the fact may be easily ascertained because of the small number of bees, and we have only to insert another queen-cell, and a comb containing eggs and brood, and await the result.

THE FINAL SWARMING.

This should be done as soon as the queen has become fertile, if the weather is pleasant and the bees are flying in large numbers. To ascertain whether or not the queen has become fertile, open the nucleus on the eleventh or twelfth day and examine the combs for eggs; their presence is proof of her fertility; now confine the queen in a queen cage. This is made by winding a piece of wire-cloth three inches square, woven about sixteen wires to the inch, around the finger, with a cork fitted in one end, and the cage slightly flattened; to capture the queen, hold the open end of the cage before her, while she travels over the comb, and as soon as she has entered, fasten the open end with another cork and place the cage between the combs, where the bees are most thickly clustered; fill up the nucleus hive with empty frames, and exchange the hives, placing the old stock on the stand of the nucleus, and the nucleus hive where the old stock stood. Thus the old bees from the old stock, returning to their old stand, are thrown into the nucleus hive; while the young bees remaining in the old stock, and the bees from the nucleus hive, will take care of the brood until aided by the constantly hatching bees. After thirty-six hours, the bees returning to their old stand, will have joined the nucleus swarm, and the queen may be liberated; to do it, blow a little smoke into the hive, open it, re-

move one cork from the queen cage and tie one thickness of *wet* newspaper over the opening, and replace the cage; this will still confine the queen until the bees get over the excitement caused by the disturbance. By that time the bees will have removed the wet paper, and the queen will liberate herself.

If the bees are swarmed when but a small number are flying, and the nucleus swarm should appear deficient in numbers, it should be strengthened in three or four days, by inserting some frames, containing capped brood, from the parent stock.

If the bees are swarmed before the queen has become fertile, we run the risk of depriving a whole swarm of their queen, by losing her when she is out to meet the drones; or if confined to the cage, she is wholly prevented from leaving the hive for impregnation; and if not caged, she is liable to be killed by the bees, that returning to their old stand, find a strange queen. If the supply of forage has been temporarily checked by a storm or drought, the bees will not return filled with honey, and the danger of losing the queen, unless caged, is increased.

If the swarming is done early in the season, (as it should be,) or when the nights are cool, the heat in the hive should be economized, by giving the bees access to only as many empty frames as they can crowd, by using the board from the nucleus employed while queen-

breeding ; allow two empty frames at first, and after they are nearly filled with comb, move the board and give them one or two more empty frames, and so on until the hive is filled ; in this manner, the bees only heat as much space as they occupy for work.

By swarming bees on this system, a fertile queen is obtained for a new swarm, fully three weeks sooner than by any other method ; the new swarm has a young and vigorous queen at once ; breeding goes on at this time of the year very rapidly, and a double number of workers are produced for honey gathering. M. Quimby, in speaking on this subject, says: "The introduction of a mature, fertile queen to a colony two weeks sooner than they swarm naturally, is an advantage sufficient to pay for the extra trouble. The time gained in breeding is equivalent to a swarm."

If a whole swarm is employed to rear a queen, much time is lost even in natural swarming ; work is suspended for nearly ten days, and if after-swarms issue, for a still longer time, and the best of the honey harvest is past before the stock gets into working condition.

While by this system, not only a larger amount of surplus honey is obtained, but it is frequently safe to make another swarm, and the colonies still be on an equal footing with those swarmed by the natural or other systems of increase. I would not recommend a

faster increase than that of doubling every year ; many persons overdo the thing, and the result is weak and destitute swarms, no surplus honey, and the loss of the entire swarm during the winter.

In short, by the nucleus system of swarming, all difficulties experienced with other systems are overcome, and the manner in which it is performed is so easy and gradual, that almost any person, if furnished with proper hives, can manage a large number of stocks with profit and pleasure, during their leisure time.

SWARMING COMPARED WITH NON-SWARMING.

Some bee-keepers, who from want of time or inclination, desire no increase of stock, but simply wish to get all the honey they can for their own use and no more, have sought for non-swarming hives. To meet their wants, numerous and expensive bee-palaces and non-swarming hives have been invented. Great yields of honey have occasionally been obtained in these hives for one or two years, and then they have proved a failure, the bees usually dying out ; a fact which would be predicted by every bee-keeper acquainted with the laws which govern the honey-bee family.

“ If swarming is prevented, some way must be provided to renew the queens every two or three years,

for swarming is the method by which nature arranges this."—E. S. Tupper.

Numerous experiments prove that if bees are swarmed they produce more honey, in the aggregate, than if left as a non-swarmed stock, the empty home and their necessities drive them, and they *all* work with a will under such circumstances, instead of hanging around the entrance of an over-populous non-swarmed hive, or lingering in the spacious honey-boxes without work.

Venders of non-swarmed hives usually base their theory on the following calculation: "Bees consume twenty pounds of honey in forming one pound of comb. The empty combs of a swarmed hive of the proper size, (2,000 cubic inches), weigh over two pounds; thus over forty pounds of honey are consumed in making the empty combs to furnish a new hive. At least sixty pounds more will be used in storing the combs and raising the brood to populate it, and at least thirty pounds more to furnish it with winter stores. This gives one hundred and thirty pounds of honey spent on the new colony. If the bees have remained in the old hive, this one hundred and thirty pounds of honey *might* have been stored in boxes." This calculation, so far as the amount of honey consumed for furnishing a new hive is concerned, is all true enough, but the fact really is, *that the bees will not put so much honey into the boxes as they will gather and store in frames, or to stock a new hive.*

Since the introduction of the honey extractor another system, other hives, and other managements have been introduced. Now hives are made expressly to be used with such machines, the interior is arranged with nearly all frames into which is stored both brood and honey, the later being thrown out with the extractor, and the comb again inserted near the centre of the hive, thus bees are not compelled to build new comb, the brood nest is spread out over the entire hive, and swarming is, to some extent, prevented. After the honey is thrown from the comb, that small per cent. as still adheres on the walls of the cells, is most profitable stored in boxes, and for that purpose they should be arranged in close approximation to the brood centre.

In order to renew the queen it would become necessary to allow it to swarm every third year, or, furnish each stock a young queen every third or fourth year.

We also recommend the following system. Swarm your bees at the rate of fifty per cent. annually; as soon as the honey harvest is over, reduce the number of stocks to your standard number, by brushing the bees containing the old queen on a sheet, before the hive with which they are to be united. (See "Uniting Bees.") Watch for the queen and take her away. Appropriate the honey in the hive just stripped of bees, to your own use, and preserve the empty comb for aiding new swarms the next season. By this method

young queens, strong and vigorous stocks, and a large yield of honey are obtained. This system when compared by actual experiment with that of non-swarming stocks in non-swarming hives, will prove greatly in favor of the swarming and *reducing* method. The greatest profit, however, will be found in a steady, judicious increase.

CHAPTER V.

IMPORTED BEES AND QUEEN RAISING.

ITALIAN BEES.

This variety—also called Ligurian bee, or “Golden Bee of Italy”—is found in the vicinity of the Ligo di Como and Maggiore, and the small district surrounding them. Although they have been known there for centuries, it is only since the year 1843 that they have become known outside of that district. The surrounding Alps, covered with perpetual snow, made it impossible for them to cross on their wings, or for the black bees to enter and produce a mixed variety.

The first step toward spreading this superior variety, was made by Captain Baldenstein, who had the first colony carried across the Alps in the year 1843. Dzierzon, of Carlmarkt, in Silicia, (a province of Prussia), introduced them into Germany in 1853. Although this variety had been successfully introduced

in Switzerland and Germany, and its value tested and acknowledged there, it was long before it became understandingly known in the United States. When they were first introduced into this country, and indeed long afterward, they were ridiculed as a humbug; even those who thought they were a distinct and valuable variety, doubted if they would be able to live in our climate, and but few would at first believe the accounts of their value and superiority over our common bee. Although the first attempt to import them resulted in failure, they were finally successfully introduced into the United States in 1860. After their introduction into the apiaries of many intelligent bee-keepers, the prejudice against them soon wore away, and now they bid fair to supersede the common black bees. A long experience of over seventeen years, commencing in the apiary of the celebrated German Apiarian, "Rev. A. Dzierzon," brought to notice many points of superiority, which seemed to have been verified by all who gave them a trial; and from the numerous favorable expressions and statements furnished to our journals from our best and most reliable apiarians, I extract the following:

"There is no mistake about the superiority of the Italian bees as honey gatherers."—*J. H. Townley, in Western Rural.*

"We believe that the superiority of the Italian bee is no longer questionable."—*California Culturist.*

"Of their superiority there can be no question."—*Dr. Metcalf.*

"*Resolved*, That the Italian bee fully sustains its European reputation, and this association heartily recommend it for general cultivation, as being more hardy, vigorous and fertile than the common variety, and as a consequence, more profitable."—*Resolution, passed unanimously at the Wisconsin Bee-Keepers' Convention.*

"*Resolved*, That, since the superiority of the Italian bee is a settled fact, we would advise every owner of a colony of bees, to Italianize them."—*Missouri Bee-Keepers' Association.*

"All agreed as to the superiority of the Italian over the common black bee."—*Report of the American Apiarian Convention.*

"My colonies are daily watched and admired by many visitors. So far as my experience has gone, I find every statement in regard to their superiority sustained. They will no doubt prove a valuable acquisition to localities of high latitude, and will be particularly adapted to the climate of Washington Territory, Oregon, and the mountainous regions of California."—*Dr. Kirtland.*

Mrs. E. S. Tupper says: "In the summer of 1863, I had but two Italian stocks to commence with, and those not pure. One of these stored one hundred and

ten pounds of honey, besides giving three swarms. The other gave two swarms and stored ninety-six pounds of honey; all the young swarms filled their hives, and some of them stored honey in boxes. I had the same season, fifty-six hives of the common bees, but not one of these stored a pound of surplus honey, though a part of them were divided. This was the poorest honey season ever known in this section.

“In the summer of 1864, I averaged from nine Italian colonies, one hundred and eighteen pounds each. The best of these shows the following record in my journal: One full swarm taken from it the 20th of May; one hundred and fifty-six pounds of honey taken in boxes; stored by the swarm, eighty pounds in a cap, and on the 15th of July, threw off a very large swarm, which filled its hive and partly filled two boxes. Thus we have two hundred and thirty-six pounds of box honey, besides two large colonies from a single hive, not reckoning the frames and partly filled boxes. I do not think a colony of the common bee ever did as much in the best season; If so, let us have the record.

“In 1865, I had an average of ninety-three pounds from six Italian colonies, all of which were divided once, and much disturbed by taking brood from them to rear queens. During the same time, I did not take a pound of honey from any colony of common bees, though I divided them all, and gave each an Italian

queen. Not only do they store more honey, but their queens are more prolific than the black queens.

“It is wonderful how much brood may be taken from one of these queens. From one hive the last season, I took thirty-two frames of brood and eggs, at different times, from which to rear queens; and from another, thirty-six frames. Yet both hives were as strong in the fall as any of the common ones, from which only one swarm had been taken. As ten frames fill one of my hives, it will be seen that this was equal to three full swarms from one, and more than three and a half from the other.”

In contrasting them with the common black bee, I find that they possess the following superior features :

1st. They gather far more honey than the common black bees. This is attributable to the fact, that they may work earlier and later in the day, are more swift on the wing, and more active in their movements. Being larger winged, they fly with less fatigue, and their individual strength being greater, they are better able to overcome high winds. They range over more than double the number of square miles in search of honey, if forage in the immediate vicinity is scarce; they will gather honey from thistle, iron-weed, and other flowers seldom visited by the common black bee, especially when forage is scarce; their longer tongue, or proboscis enables them to reach into the flowers too deep for

the common black bee ; they work more steadily through the season ; when the common black bees are hanging idly about the hive, the Italians are constantly at work ; their queens are more prolific, consequently more workers are to be found in a stock of this variety, they are long-lived, while the common black bees lose a large number of their working force by an early death.

2d. The queens are more prolific breeders ; they not only lay more eggs in a specified time, but also commence to breed earlier and continue later in the season, consequently the stocks increase faster, usually swarming several weeks earlier, oftener, and in seasons when the common bees do not.

3d. They are less inclined to rob each other, and defend their hive more effectually against robbers of any variety.

4th. They guard their hive better against the invasion of the moth miller, and their combs are seldom, if ever, injured by the depredations of the bee-moth.

5th. The *pure* Italians are of a more amiable disposition, often to such an extent that some assert they will not sting under any circumstances ; another calls them, on account of their peaceable disposition, " the domestic or tame honey-bee ; " and the common bees are called by the same writer " the wild bees."

6th. In performing the various operations connected with the successful management of bees, the Italians remain more quiet, and "cling more tenaciously to their combs;" and the queen is more readily seen on account of her bright contrasting color.

7th. They are more inclined to supercede their queen when past her prime, consequently are not so liable to become queenless; and being longer lived and hardier, they winter more safely, and queenless colonies do not so rapidly become weak and depopulated.

8th. They roam over a larger space, which admits of keeping a greater number of colonies at one place, or at places where forage is scarce in the immediate vicinity.

9th. In forming nuclæ, or changing the position of a colony, they more readily adapt themselves to their new location.

10th. In transferring bees from one hive to another, or in uniting several swarms, the Italians are less inclined to quarrel or kill each other, thus greatly facilitating the operation.

11th. Their amiability, swift movements, graceful form, and beauty of color render them attractive to visitors and every person of taste.

DESCRIPTION OF QUEENS, WORKERS AND DRONES.

The *pure* queens differ in color from the queens of the black species : the color is of a peculiar hue, and many persons in describing one individual queen frequently vary in the terms employed in their description. On examining a large number of queens in their native home, also a very large number raised in Germany and America from queens of undoubted purity, I found that the largest portion of them were (according to my term or name employed,) of a leather colored or *dark* orange hue. Some, however, vary, being of a lighter hue. Although such queens may be more attractive in appearance, they are, as far as my experience extends, by no means the most desirable as breeders ; they, like the pale-faced individuals of the human family, seem to be weak, less prolific, and, in many instances, their eggs will not hatch. Several eminent bee-keepers seem to have experienced similar failures. Mr. A. Grimm says : “ Conversing with Prof. Mono, (of Italy), one day, about the beautiful golden colored queens sold in America, he related the following :—‘ We had a pretty nice queen this spring, and intended to breed from her, as our customers in Germany often ordered nice colored queens ; but we had so many crippled and deficient queens from her progeny, a number of which never laid an egg, and the eggs of those that did, never hatched, that we re-

jected her as unfit to breed from. We are convinced that the darker queens are hardier and more prolific.' I must add that on my return from Europe, I found in my apiary four of those pretty yellow queens whose eggs would never hatch."

I find that light colored queens may be produced by taking all possible care that they remain without admixture, and breeding them "in-and-in" for a great many generations, will gradually change them to a lighter color; yet so gradual is this change that each queen may resemble her mother in color. M. Quinby says:—"The light color will not be fixed until it has been uniform through several generations." A darker hue of the queen's color is *sometimes*,—and probably frequently,—caused by an admixture of the black or common bees.

All queens raised from a *pure* queen under equal circumstances—that is, under an abundance of natural forage and fair weather,—have appeared to me to be so near the color of their mother as to make detection difficult; while queens raised from mothers of doubtful purity vary greatly in color.

A few parties, breeding queens for the market, claim that they "have improved the purity of the Italian variety." By breeding from the choicest queens, the most prolific breeders, and avoiding in-and-in breeding, the variety may be prevented from degenerating;

or even *more* prolific breeders may be obtained by so crossing them, if the mother has somewhat degenerated.

A queen fertilized by a black drone, produces pure Italian drones, but the workers are a mixture of both varieties, yet not uniform ; some are almost Italian, some almost of the black species, and others still are more or less of either species. The assertion, however, that some workers will be *pure* Italians and some others pure black bees is not correct ; if examined closely, it will be seen that they are *not quite* pure.

The worker bees, if produced by a pure queen fertilized by a pure Italian drone, have the upper half of *three* abdominal rings of a bright yellow color ; the segment joining the abdomen to the thorax being the first. When young, the body is covered with a delicate coat of hair, giving the entire body a light appearance ; when older this hair begins to wear off, and the bee attains a glossy black appearance. In making examinations as to the marks of the workers, only the young bees should be examined ; the older ones, after they become glossy, are deceptive, and frequently bees from other colonies join. When filled with honey, or extremely extended from other causes, some workers occasionally show even a part of their fourth abdominal ring slightly marked. Among others I raised two queens last summer, which produced workers having the fourth ring, (on the sides only), marked as broad as

any of the other three. These, however, are the exceptions and not the rule.

The drones seem to vary in color more than either the pure queens or workers ; the general marks are three very narrow stripes on the edge of the first three rings of the abdomen, where the workers have the black edge to the yellow bands ; also, some brown spots on the sides of the abdomen and on those parts of the first three rings where the workers have the yellow bands. The marks of the drones, like those of the workers change to a darker hue as they advance in age.

CHANGING A STOCK OF COMMON BEES TO ITALIANS.

This is accomplished by removing the black queen, and substituting for her a fertile Italian queen. The queen being the mother of the whole colony, the increase of that variety cannot continue if she is removed, and the workers already there will gradually die off until all are gone. The Italian queen given to the colony instead, will commence laying almost as soon as she gets on the combs. Three weeks later her progeny begin to hatch, taking the place of those black workers that are dying from natural causes ; and in from four to six months, all the black bees will have died, and their places be filled by pure Italians.

The queen with which you wish to commence, should be pure beyond doubt. Purchase of some one who will guarantee her purity, and whose guarantee you can trust. The fall is the best time to purchase your queen ; in such a case she will be ready for the rearing of other queens from her brood the next season. As soon as the box containing the queen is received, set it in a cool and dark cellar, or place it under a box, in the shade of a tree, admitting plenty of air.

DIRECTIONS FOR INTRODUCING A QUEEN.

Select the best and strongest colony, and open it when almost all of the bees are abroad. Lift out one of the middle combs gently and look carefully over both sides for the queen ; disturb the little cluster and scrutinize the dispersing bees ; if not found on the first comb, instead of returning it to the hive, put it into an empty hive, or lean the frame against the hive ; lift out and examine the next frame, and so on. If the queen cannot be seen on the combs, the bees in the hive, and sometimes all the bees from the combs, will have to be brushed on a sheet and required to travel several feet to the hive, when the queen can be found and destroyed.

Now remove the old stock of comb and bees to a new stand about three rods distant ; take out four frames, brushing back all the bees ; put these frames with comb

into a new hive, close all entrances, and set it where the old hive stood. Take the box containing the queen to a room, shut all openings for escape, and open the box before a window, lift out the frame and pick the queen from the comb, seizing her by the wings ; if she should fly, she will alight on the window. The queen should then be taken to the hive containing no bees, and placed on the combs, and the entrance opened just enough to admit a single bee at one time ; the bees, returning from the field full of honey, finding every thing out of order and their queen gone, will readily accept the strange queen.

Near sundown, spread a sheet before the hive containing the Italian queen, bring the old hive near, lift out the combs, brush the bees on the sheet in front of the new hive, and put the combs in the last-named hive ; next morning open the entrance as wide as usual.

The following is another method : After removing the black queen, treat the bees to a double dose of smoke ; take the Italian queen, smear her back with honey, and upon returning to the hive, blow in a breath or two of air to expel a greater part of the smoke, and then drop the queen among the bees from above. As soon as the bees get over the effects of the smoke, they will lick the honey from the queen and become acquainted with her.

Another method is as follows :—Secure the queen in

a wire cage, (See "Nucleus Swarming"), fasten one end with a piece of old comb, about one inch square, containing honey in open cells, so that the queen may feed herself; place this cage in the centre of a brood comb where the bees are most thickly clustered, and after thirty-six hours liberate her as directed in nucleus swarming.

OUR METHOD OF INTRODUCING A QUEEN.

This method is founded on the theory that bees recognize each other by their peculiar scent, and the result of this method supports that theory. Over five hundred queens have been introduced upon this method by myself and our agents, and yet not a single failure has come to our knowledge.

Make the following solution :—In a pint of water dissolve two table-spoons full of brown sugar, and scent it with either grated nutmeg, extract of anise, peppermint or wintergreen.

Subdue the stock of bees into which the queen is to be introduced, in the usual way for handling bees; open the hive, lift out a comb, and look carefully for the old queen, if she is seen, catch and destroy her; next sprinkle the bees and comb with the solution, and set the comb and bees temporarily into an empty hive; in this manner, handle every comb in the hive, sprinkle the inside of the old hive, spread a sheet in front of the

old hive, shake or brush the bees from the comb on the sheet, and let an assistant sprinkle some of the solution on the bees, return the comb to its original hive, and having the new queen ready, take her by the wings, dip her in the solution, drop her among the bees on the sheet, and hive all back into the old original hive, containing the combs, in the manner of hiving a new natural swarm. Care must be taken to guard against robber bees.

To introduce an Italian queen to a colony of black bees in the common or box hive, drive out the bees as directed for forced swarming, and find their queen by making them travel over a sheet to a box; if the queen is not seen the first time, they must be poured out again and the search repeated; after the queen is found and destroyed, the Italian queen may be introduced by the second or third method, as explained above.

If the queen is introduced on the third method, the combs must be examined in a week after she has been liberated, and all queen-cells started during her confinement must be carefully cut out.

If the queen is introduced in the spring, she may be given to the queenless part of an artificial swarm, or added to a natural swarm after finding and destroying its queen.

HOW TO ITALIANIZE AN APIARY.

After one stock is Italianized, the bee-keeper may begin to change the rest of his stocks to the Italian variety. As soon as spring opens, the Italian stock should be fed daily, and if possible the hive should be set where it can have plenty of sun and be sheltered from the north and west winds, which will, together with the feeding, induce early breeding. All drone-comb should be placed near the middle of the hive, to promote the early production of drones; and if fed regularly, Italian drones will appear in large numbers several weeks sooner than the black drones.

As soon as several inches of capped drone-brood can be found in the Italian hive, form one nucleus in the manner directed for nucleus swarming; feed the bees in the nucleus hive regularly, in order to obtain a large number of queen-cells and to keep them on the combs as much as possible, or else cool weather may chill the brood. While the nucleus swarm is constructing queen-cells, transfer all your black bees in common hives to movable-comb hives; place the *empty* drone-comb in the outside frames, and cut out and reject all drone-brood that may be found; open all movable-comb hives containing common black bees and cut out all drone-brood and drone-comb from near the breeding core; in this manner the production of black

drones may to a great extent be prevented. If stocks belonging to your neighbors are to be Italianized, they should be brought to your apiary and treated in like manner. If the combs taken from the Italian stock are replaced with empty combs, other nucleæ may be formed as soon as the first drones begin to hatch, that being the proper time.

Nine days after forming the nucleus, open it and ascertain the number of perfect and separated queen-cells, and for every four cells in the nucleus, remove the queens of three colonies. On the next day, transfer a perfect queen-cell to every queenless stock, inserting it near the centre of the brood and mark the frame so as to facilitate the examination made on the next day to ascertain their condition; if any of them are destroyed, another one must be inserted from the reserved cells in the nucleus. One cell should remain in the nucleus, and the entire nucleus used to form another nucleus swarm at the proper time. If, after replacing such cells as may have been destroyed, any cells remain, they may be used in new nucleæ, formed from black colonies, preparatory to swarming.

By the above method, the stocks are without a laying queen for a short time, causing them to become somewhat weakened, besides the risk incurred in getting some queenless colonies by losing the queen when out to meet the drones; or, if brood in the proper

condition is found in the hive at the time the loss of the queen occurs, some stocks will raise a black queen. To avoid this as much as possible, some prefer to raise a queen in a nucleus and introduce her after she has become fertile. To do this, form a nucleus as in the first method ; ten days later, form other nuclei and transfer a perfect queen-cell to each ; as soon as hatched and fertilized, introduce them to colonies of black bees and rear others for forming nucleus swarms. Get one Italian queen for each hive the first year, even if a number of them are fertilized by black drones although their *worker* progeny will be hybrids, the *drones* produced by them will be pure, and if no black queens are in your apiary, none but pure Italian drones will be hatched. If any queens are found to produce workers showing less than three yellow bands, the young bees and those just hatching, should be examined, and if all do not show three bands, the queen is not purely fertilized ; and to furnish the stocks with pure queens, another set should be reared from the original pure queen ; she being now, almost sure to meet pure drones. This replacing should be done before they swarm, or before they rear queens from the hybridized eggs of the original queen, as such queens although fertilized by pure drones would produce impure drones.

REARING ITALIAN QUEENS FOR THE MARKET.

The known superiority of the Italian bee, produces a great and constant demand for pure queens. The price that parties who have been at the expense of importing queens, and Italianizing the bees in the entire neighborhood, have to charge for *pure* queens, has induced many persons to ingage in the business of raising them. Many of these persons are not competent to judge as to the purity of the queens from which they are breeding, or that of the queens sold by them, thus greatly endangering the reputation of the pure Italian variety. Others endeavor to make capital by advertising, using enlarged cuts of *their* bees, more highly colored than any colony ever yet found in the country ; or by claiming that they have the only existing situation for raising pure queens. All beginners should be sure that they have the pure variety. To obtain it, get your first queen from reliable parties, and demand some sort of security ; then begin to rear them upon practical and simple principles ; many columns written on this subject are better adapted for the guidance of the "bee juggler," than for that of the practical queen-breeder.

I do not think it wise for persons rearing queens to sell, to send any but those that have been tested and proved to be pure. The practice of selling hybrid queens, or sending those not tested, to parties com-

mencing in the business, and promising to replace them if not pure, is a bad one. The purchaser, probably, has never seen an Italian bee and cannot be a judge of purity. In many cases he will be satisfied with what he gets, and begin to breed queens from her. Although any mixture of Italian blood is an improvement on the black variety, yet in the following generation not even the drones will be pure, and the stocks finally degenerate, becoming little better than black stocks, and the purchaser is disappointed and discouraged.

It is always the best policy to pay a large price for a queen, *warranted pure*, by one whose reputation is at stake in the matter, than to get a cheap queen which may be a hybrid. It can be easily understood that a person, who has nothing to charge for but the simple act of raising a queen—whether hybrid or not—can sell them very cheaply.

After having Italianized all your bees and those of your neighbors residing within three miles, queens may be raised without much fear of having them fertilized by black drones. Having already given the directions for raising a few queens, I shall now point out the rules to be observed in raising a larger number.

NUCLEUS HIVES.

After using various styles and sizes of nucleus hives, we have found that none are more convenient and prof-

itable than a narrow hive, holding just two full combs of the same size as those used in the other full sized hives ; the nuclæ hives should be side and top opening, and must have an arrangement on top to provide bees with water, honey or syrup ; the entrance should have a regulating slide, and the top an arrangement to ventilate at will.

To enable the queen to distinguish her hive more readily when returning from her meeting with the drones, these hives should be painted with a variety of bright colors, each differing from the other. Each nucleus should also be numbered and a record kept of the condition of each hive ; or pieces of slate or slated paper may be attached, or one side painted with liquid slating, whereupon the proper record may be kept.

QUEEN REARING.

As soon as drones appear in the spring, deprive a strong colony of its queen, leaving your pure stock undisturbed, and allow it to remain so five days, then open it and clip out *all* the queen-cells that may be started. Select a comb containing eggs and unsealed brood from your pure stock ; cut a strip of comb one inch wide, and make several other openings one inch deep just below those cells containing eggs, and insert this comb near the middle of the queenless hive. These openings are made to enable the bees to lengthen

the queen-cells and also to permit the easy transfer of the latter. On the same day, another colony may be deprived of its queen, and five days later, the queen-cells cut out and a comb taken from the pure colony, and prepared as above directed. The pure colony should be provided with empty comb, and fed daily, to promote breeding. The forming and stocking of the nucleus boxes should next be considered. If one or more stocks of bees can be obtained from a distance—not less than two miles—it is by far the better way. One week after the first queenless colony has received the comb from the pure stock, bring the stock to you. apiary, and before they are allowed to fly and mark their new location, transfer them at once to the nucleus hives, giving each hive one frame of brood and one of honey; insert and give each hive at least one quart of the bees. Confine them to their hive, by fastening a piece of wire cloth over the entrance, so as to admit air; fill one of the feeders with pure water and the other with honey, and set the hives away from the bees, scattering them along the shrubbery or under small trees. Near sundown of the following day, the entrance may be opened, and the bees allowed to fly. If bees cannot be obtained from a distance, the nucleus boxes may be stocked from any of your own colonies. In such a case, more bees have to be put with each nucleus, as many of the old bees return to their old stand. See “Nucleus Swarming” and follow the directions given for forming the nuclei.

The queenless stocks will now have queen-cells on the comb given them from the pure stock. Ten days after the first stock has been provided with a comb from a pure stock, each perfect queen-cell should be transferred to a nucleus; if the nuclæ have commenced to build queen-cells, they should be clipped out at the time of transferring the perfect queen-cell. The comb from which the queen-cells have been cut may be returned to the pure stock, and another comb containing eggs and unsealed brood may be given to the queenless colony. Two or three days after the queen-cells have been inserted in the nucleus, they should be examined, as some cells may be destroyed or prove worthless, and they will have to be replaced with others. If new cells are needed, open the next queenless stock started five days later, and cut out the most matured *capped* queen-cell, and insert it where required. At the same time ascertain the number of perfect queen-cells remaining, and at once form new nuclæ as directed in the first case, and transfer the queen-cells on the tenth or eleventh day after the stock has received the comb from the pure hive. If any of this lot of queen-cells should be destroyed, or prove worthless, they may be replaced with others, taken from the second set of queen-cells started in the first hive. The nucleus should be fed regularly unless the bees are storing honey. Guard against robber-bees, as nuclæ, small, weak and queenless, would soon be destroyed by them.

As soon as the queen is hatched in any nucleus, exchange one of its combs with comb containing *unsealed* brood ; this will not only strengthen the nucleus, but will induce the bees to remain on the comb, while the queen leaves the hive for the purpose of meeting the drones ; without it, the bees occasionally swarm out with the queen, and are lost unless seen.

The queen-cells constructed from time to time in the queenless stocks, must be transferred in ten days after inserting the comb from the pure stock. If any stock becomes reduced in population, another strong colony may be employed in starting queen-cells, and its queen given to the reduced colony ; or, the weakened colony may be strengthened by exchanging a few of its empty combs for combs containing bees just hatching ; in this case, the combs should be examined five days after, as queen-cells may be constructed from the combs last added, and if they are found they should all be cut out.

The presence of eggs in the brood-combs of any nucleus indicates that the queen has become fertile, but her purity of impregnation should be tested before sending her to the purchaser.

FERTILIZING OF QUEENS IN CONFINEMENT.

“The queen and drone must be on the wing, or they will never mate.”—L. C. WAITE.

That queens can be fertilized in confinement has been

frequently demonstrated by many of our bee-masters, and in our own experiments we have succeeded in securing the fertilization of several dozen ; but the general result of our experiments with nearly every method known, has been so varied that as yet we cannot call it a success.

The following has proved the most successful:—Take wire-cloth woven about eight meshes to the inch, and construct a cage a foot in diameter, and oval in shape, five days after the queen has hatched from the cell, put her with three choice drones in this cage and close it to prevent their getting out, then leave this cage with the bees in the sun for an hour or two ; if the queen does not become fertilized the first two hours, return her to her hive and confine her to it, and place her with three drones in the wire cage the next day, for an hour or two, and thus repeat until she becomes fertilized.

By the following method we had a few queens fertilized, and as it is very simple it recommends itself to the masses for a trial. I have taken the two combs, bees, queen and all, and placed it on one side of a No. 1 Champion Hive, in the roof I cut a hole to receive a glass eight by ten inches, placed the roof on the lower part of the hive, covered the glass until two days after the queen emerged from the cell, then I uncovered the glass, removed all but about one dozen of the best colored drones, and closed the hive ; through the roof I

placed a feeder containing water: in this condition they were left until after sundown of the third day after closing the hive, at that time the hive was opened to examine the queen, if the evidence of impregnation (the male organ of the drone protruding from the queen) was seen, or eggs found in the comb; if after examination she proved fertilized, we covered the glass in the roof and allowed the bees to fly at will; but if the evidence of fertilization was not seen, the bees were again confined until after sundown of the next day, and so on until the queen was either fertilized or *dead*.

L. C. WAITE, of St. Louis, says of the above: "This I have done often, and can and will do again. Why can not others do the same thing?"

SHIPPING QUEENS BY EXPRESS.

The shipping box should be two inches wide inside, and four inches in length and height. It may be made of half inch lumber, with a cleat nailed across the ends, to serve as rabbits upon which to suspend the frame. Make openings in the sides near the bottom of the box, and in the middle of the top, and cover them with wire cloth so as to admit air; affix the label and the address of the purchaser to one side of the box. Make a frame sufficiently small, so that when inserted in the shipping box there will be at least one quarter of an inch of space around the frame. Open the nucleus, and cut a

piece of comb containing capped honey of sufficient size to fit in the frame of the shipping box. To prevent the comb from breaking out of the frame while on the road, tie two pieces of heavy tape around the frame before inserting it, and nail the ends of the frame top fast to the box; next brush in about one half gill of bees, then lift out the frame containing the queen and gently brush her into the box with a soft feather. This being done, screw down the lid, fasten a wire queen-cage upon it, and forward a box to the purchaser. Directions for introducing the queen, together with information of the time of your intended shipment, should be sent a week previously.

SHIPPING QUEENS BY MAIL.

Many purchasers reside at a great distance from any express office, but usually have a post-office in their immediate vicinity, and in sending a box by express a long distance, the expense is great, while in sending it by mail the distance makes no difference in the cost of transportation; hence, it is not only more convenient to send queens by mail, but it is also cheaper, so long as her breeder warrants her safe arrival at the place of destination. Shipping boxes especially adapted to the purpose, are required in sending queens by mail.

We, no doubt, were the first breeders who attempted to forward bees by this thoroughfare, and in 1866, after

many various experiments, successfully sent a choice queen from the Mississippi River to Stockton, California, by the so-called "Pony Mail."

The most convenient shipping-box is made of one-eighth inch board, in length and width the same as a No. 5 envelope, and one inch deep in the clear, the sides should be narrow enough to leave a crevice of about one-eighth of an inch next to the bottom and top to admit air; next cut a piece of *old* and *tough* comb, one inch wide, containing *capped* honey, place it across the centre of the box, the capped ends of the honey cells towards the ends of the box, fasten the comb by pushing a one inch finishing nail through sides of the box into the end of the piece of comb, cut a notch in the middle of the comb to allow a bee-passage from one end of the box to the other; next set the box into a stock of bees to have the running honey cleaned up by the bees, this being done, the box is ready to receive the queen; open the nucleus, and brush a few dozen workers into the shipping box, and lay on the top to retain them, find the queen, seize her by the wings, move the top of the box and gently insert the queen, nail on the top, add the directions, address of purchaser, and the postage, and all is ready for the mail.

Another shipping cage is made by making a tube of wire screening about four inches long, with a disk about two inches diameter in each end, on the inside of each

disk fasten a piece of sponge, saturated with honey and water.

NOTE.—To hasten the fertilization of the queens, the breeder should encourage the production of pure drones. The chances for the young queens to become impregnated are better in proportion to the number of drones. The breeding of queens may be continued until late in the season, even until October, if drones are retained until that time. To do this, deprive of its queen a colony containing a large number of drones as soon as the bees begin to exclude and destroy them; the queenless colony will tolerate the drones, and if a piece of comb containing capped brood is set near the entrance of the queenless hive, so that the bees can cluster upon it, the drones excluded from other hives will join them in large numbers. Such stocks should be fed occasionally. Although queens may be raised late in the fall, I would advise bee-keepers to rear the number of queens desired during the months of June, July and August; some of the queens reared earlier may not become fertilized, and many, raised later, are lost.

By the use of nucleus hives, having combs of the same size as those in their regular hive, no comb need be cut; and in the fall, the combs and bees may be inserted in any hive where needed. After queen-raising ceases in the fall, the bees from small nuclei may be united and provided with a queen, forming a separate colony, or they may be united with other stocks.

EGYPTIAN BEES.

The native home of this variety is Egypt, Arabia and Syria, and it is also found, with slight variations, on the northern declivity of the Himalaya mountains in China. The bees that exist in Palestine at the present day are the same as the Egyptian variety, the only difference being that the first-named are a little larger; they inhabit hollow trees and clefts of rocks, and it is supposed that it was from them that honey was obtained by Samson.

The Egyptian variety was brought from Cairo (Egypt) by the Acclimatization Society of Berlin, in Prussia, (Germany,) in 1864, under the supervision of G. Vogel. In the following year they were imported to England, and subsequently to the United States. Rev. L. L. Langstrath speaks of the workers as having a yellow spot on their backs, and brilliant yellow, black and white abdominal rings. He also speaks of the queen as being elegantly marked, and drones very beautiful.

Prof. Gerstacker, of Berlin, Prussia, says the Egyptian bee is nearly one-third smaller than the common bee or the Italian. Her abdomen resembles that of the latter, but the corselet or shield is yellow. The downy hairs of the thorax and abdomen are whitish.

When the bees of an Egyptian stock begin to fly,

a few bees do not come out at a time, but nearly the whole swarm is suddenly in full flight. They always rush forth from the entrance like an issuing swarm in swarming time. The common bee is very soon overtaken by an Egyptian bee, in a race. The common or even Italian bee walks slowly and heavily over a comb, while an Egyptian runs as quickly from one side to the other as the comb can be turned around. Great activity and agility are the characteristics of the Egyptian bees.

Prof. A. Gerstaker, in concluding a very extensive treatise on the distribution of the honey-bee, observes that the most valuable variety for Europe would be the Egyptian—partly on account of their beauty, and partly because of their unwillingness to use their stings, which latter characteristic appears to be common to all African bees, and is also one of the recommendations of the Italian bee. The Syrian bee assimilates so closely to the Egyptian, that it may prove equally valuable. Next to these in value are the bees of the coast of Asia Minor.

CHAPTER VI.

THE APIARY.

SITE AND PREPARATION FOR AN APIARY.

While every rural home is favored with a suitable place for a few stocks of bees, I would advise the novice to choose a spot agreeing, as near as possible, with the following hints on the subject :

Find a place with shady trees, the limbs of which are not so low or dense as to interfere with the flight of the bees, away from dusty roads, and from places where horses or cattle are accustomed to stand, on the south-east side of a gently sloping hill, near running water, with a grove of trees or a high hill north-west of it. If such a place can be found, it is the most desirable known for the purpose. Hives may have their entrances in almost any direction ; yet to have them face south or east is preferable. The sun shining against the entrance induces bees to begin their labor early, and

winds coming from those directions are more mild. Plant trees, if not already favored with them, and set one or two hives under each tree. The common Morella cherry is a good variety for the purpose. Never set the hives against old buildings or fences, as they are generally infested with spiders, roaches, ants, millers, etc. The best apiarians condemn bee-houses as unprofitable; the cost of construction, and the loss of young queens, killed while attempting to enter the wrong hive on returning from the meeting with the drones, caused by crowding hives closely together, and the lack of a free circulation of air, are a few of the many objections to bee-houses.

An apiary may be tastefully arranged by enclosing the spot used for the purpose with a tight board fence on the north-west side, to shelter the bees from cold winds. I, however, prefer a screen of evergreens, with rows of cherry trees before it. The stands for the hives should be low and movable; take two pieces of two by-four inch scantling, and nail thereon a board about sixteen inches square; if a higher stand is desired two-by-six inch scantling may be used. About four feet from the fence or evergreen screening, make a path of saw-dust or spent tan-bark, and upon it set your stands and hives. The saw-dust will effectually keep down the grass and weeds, and preserve cleanliness in the immediate vicinity of the hives. If the shade of trees cannot be obtained, a shed may be erected over

the hives. This should be about four or five feet wide, and about five feet high, and open all around, so that it will not interfere with the operations about the hive. Never crowd hives together for the purpose of getting them under a shed; rather let them be without it, or build a separate shed for each.

DIRECTIONS FOR PROCURING BEES TO STOCK AN APIARY.

PURCHASING BEES.—It will be best for beginners to send a movable-comb hive, before swarming-time, to a place where they can obtain a natural swarm, and have a swarm hived into it. Always purchase the first or prime swarm, and see that it is given to you. Never buy a second or late swarm, as they seldom fill their hive or gather enough stores to last them during the winter.

If full stocks are to be purchased in the common hive, the indications of their value vary at the different seasons of the year. If in the spring, drive the bees up among the combs with smoke, turn it bottom side up and examine the combs; they should be free of mould, and if in nice broad sheets of worker-comb, are better adapted to be transferred into movable-comb hives. Gently pull the combs apart and search for brood; if found, it indicates the presence of a fertile queen. See whether an excess of bee-bread is present.

Lift the hive, and judge of the amount of honey it contains by its weight. At this season a stock will, of course, contain a less number of bees than at a later period, yet, a goodly number should be present.

If purchased in the fall, the value of a stock is in proportion to the number of bees, and the quantity of honey it contains, the appearance of the comb being also taken into consideration. If the purchased stock is not to be Italianized, the age of the queen should be ascertained; if the stock swarmed that year, it will usually have a young and vigorous queen. Second swarms of the *previous* year's issue, if they have filled their hive and are strong in numbers, are valuable stocks to purchase; such stocks contain young and vigorous queens, and usually have nice combs and very little old and soured bee-bread. It frequently occurs that, after transferring good stocks to the movable-comb hive, honey is left out for table use, equal in value to the purchase price of the entire stock.

MANAGING BEES ON SHARES.—Persons having the necessary knowledge of the management of bees frequently take and manage the bees of their neighbors, the person taking them furnishing the hives, and usually getting one-half of the increase and honey, or more if transferred to movable-comb hives.

TAKING UP STOCKS FOR NEIGHBORS.—The method of taking up light stocks—which would probably die

during winter—with fire and brimstone, is yet occasionally practiced by some bee-keepers. Such persons are usually glad to have their more experienced neighbors come and do the job of “taking them up.” Drive the bees from the hive into a box, and as such swarms are too small to winter separately, two or more should be hived together, and provided with surplus honey stored in frames. The empty combs can frequently be sold at the price of beeswax, yet they are far more valuable for use in a bee hive or honey-box, if white. Such combs may be fastened into frames with melted resin, and used to fill up those swarms having four or five frames of honey. If the frames and combs inserted should be deficient in bee-bread, they should be provided with that article from old stocks, having a surplus thereof. If the hive cannot be filled with empty combs, the space should be contracted by inserting a partition board.

Surplus honey stored in frames should always be kept on hand for such purposes; it may also prove useful in preparing your apiary for safe wintering. The outside frames of hives will usually be stored with honey. If such side combs are removed in time, the honey is usually equal to box honey; and if not used to supply weak colonies it may be readily sold.

TAKING BEES AS PAY.—Bees may be obtained by taking the agency for the sale of rights and hives, or by

selling territory, accepting as pay a sufficient number of bees to start an apiary, while enough money may be obtained to pay the cost from parties to whom they can sell for cash.

BEE HUNTING.

Many persons get a start by hunting wild bees, and the following directions, if complied with, will aid the beginner in the operation. In early spring, or after pleasant days in winter, during which the bees fly, and snow is yet on the ground, the tree which they inhabit may be found by looking for dead bees on the snow, near large and hollow trees; the greater number will be found directly under the one used as their habitation. They may also be *lined* from sugar-camps, buckwheat fields, or from places where they resort for water.

The usual course is to find their line of flight, and to follow it to the tree. To do this, prepare the following bait:—Dilute a small quantity of honey with water, which will aid the bees in filling themselves more quickly; add a few drops of oil of anise, the smell of which will attract the bees, and if taken by them causes them to fly more slowly, and they can consequently be more readily seen in their line of flight; put it in a vial until needed. Take a piece of comb about two inches square and a small piece of board upon which to lay it, a glass tumbler and a piece of dark colored

cloth. Thus equipped, proceed to some open spot in the vicinity of large trees ; place your board with the comb upon a stump or stake, about four feet high, and pour some of the bait honey in the cells of the comb. Look among the surrounding flowers for a bee ; catch one by placing your tumbler over it ; the alarmed bee will rise, keep your tumbler inverted, withdraw the flower, place the cloth under the glass to prevent the bee from escaping and carry it to the baited comb ; wait until the bee becomes quiet, then withdraw the cloth and gently place the tumbler over the comb ; wrap the cloth around the upper part of the tumbler to darken it ; the bee seeing the light below, will descend, and coming in contact with the honey, will begin to partake thereof ; now remove the tumbler gently, step away a few feet, lie on your back on the ground and fix your eye in such a way that the bee on rising, will be between it and the clear sky. When the bee rises, watch its movements ; at first it will describe a series of circles and then start in a *direct line* for its home. In a few minutes it will return accompanied by several others. As soon as you are positive of the direction taken, place your tumbler over the bees on the comb and move it a few rods in the direction of their flight. The distance to their home may be nearly ascertained by sprinkling a little flour on some of the bees, and if they return in three to five minutes, the tree is not far distant. Stake out the line,—unless you have an assis-

tant,—and again cover the bees on the comb and carry them a few rods to either side of the *line*, having previously selected some open spot, so that the bees may be easily observed as they fly from the bait. To move the bait with the bees, gently cover them with the tumbler as soon as they alight, so as not to disturb them, and stop before they have filled themselves and start to fly, or else the confinement will alarm them and it is probable they will not return. If the tumbler is removed before they start from the comb, the bees in rising from the bait, finding themselves in a new place, will make aerial circuits as before. To retain the first line,—should the bees fail to work satisfactorily on the second,—leave a piece of comb containing some honey at the first starting point.

After the course of the bees from the second point is ascertained, mark it out with stakes, this is called a cross line. If the two points from which the lines are started are over one hundred yards apart, and the lines cross each other almost at right angles, the tree is more easily found.

After a cross line is thoroughly established, we must ascertain where these two lines meet. If two persons are hunting together, it will be very easy to find the place, each following one of the lines as nearly as possible, until they meet, and by a careful search among the surrounding trees, the proper tree is soon found.

To find the place where the bees enter the tree, walk slowly backward and forward in its shadow, so as to bring every point of its trunk and large limbs in range between the eye and the sun ; look just below the sun where the bees are easily seen,—being distinctly revealed by the reflection of the sun's rays upon them. If the bees are to be hunted early in the spring or late in the autumn, when they are not at work on the flowers, they must be attracted to the bait by other methods. Choose the middle of a warm day, and being provided with some old comb and a few matches, in addition to the equipment before described, proceed to some open place near the supposed locality of the wild bees, start a fire and burn a piece of old dry comb or beeswax, upon which a little oil of anise has been dropped. In about half an hour, the bees will come along the line of smoke, near which line the bait should be placed ; as soon as you perceive their presence, cover the burning comb with leaves or dirt, and as soon as the course taken by the bees from the bait is ascertained, proceed as directed in the first case.

After a tree is found mark it with your initials, and if safe, let it remain until drones appear in May ; then, if the queen should be killed in falling the tree, there will be eggs in the combs from which to rear another queen, and drones for her fertilization.

REMOVING BEES FROM TREES.

If a tree inhabited by bees can be climbed to the entrance hole, ascend and give the bees a dose of smoke, after which an opening may be cut and the contents extracted and let down by means of a rope, in buckets or boxes ; or the tree may be felled, and after the bees have become quiet, they can be subdued with smoke, the part of the tree containing the bees split open, and the combs and bees transferred to a movable comb hive, in the manner directed for transferring from a common hive.

HOW TO CAPTURE ROBBERS, OR WILD BEES
WITHOUT FINDING THE TREE.

By the use of the following method, a large portion of a swarm of bees may be captured, without taking the trouble to hunt the tree, or without cutting a tree when found, should its owner object. A few of the bees remain with the queen, but if several swarms are near, enough are frequently captured to make a good swarm. If there are apiaries close by, *many of the captured bees may belong to your neighbors.*

Make a box large enough to cover the top of a hive, having a wire-cloth top to admit air and light, and a large hole in the bottom, covered with a movable slide, which can be removed or adjusted by means of a wire

rod or string through a hole in the side. Procure the bee-trap of the Champion hive, and from one of these hives remove cap, honey-boxes and frames, equip yourself, as before described, for bee hunting, and take the articles above-mentioned, into the supposed vicinity of *wild* bees, and a mile or more from any apiary. Place the box upon the hive, set the bait upon the alighting board and get the bees to work upon the bait, as directed for bee-hunting; in a short time the first bee will return and fill itself again, repeating the operation three or four times; finally, a few others will accompany it, and the number will gradually increase until they come by hundreds.

Now set the bait inside the hive, close to the entrance, and put a drop or two of honey a little in advance of it; as soon as the bees enter the hive for the bait, move it back gradually, until the middle of the bottom is reached. When a large number of bees begin to come and go, and it is not too near night-fall, adjust the trap in the entrance so that it will not project in front, and so that the open side of the trap will be out; close up every other entrance, and remove the cover from the observing glass in the rear of the hive.

After enough bees have crowded into the hive to cover the glass, replace the cover of the observing glass, and allow them to ascend into the box. As soon as the greater part of them have entered the box, close

the slide in the bottom, to prevent their return, and uncover the glass of the hive.

As often as the bees cover the glass, darken it and draw the slide from the hole above, when the bees seeing the light will ascend. If the bees cease coming before enough are captured to make a good swarm, close the opening in the bottom of the box, and let a few bees fly, until a strong line is again established.

Another method is to bait the bees through the fly holes near the top of the hive, and then insert a tin tube in one of the holes. This tube should be seven inches long, wide enough at one end to fill the hole without projecting outside, and not more than one-quarter of an inch wide at the inner end. Close up the other hole and the entrance, and proceed as in the first case.

After as many bees as possible are obtained, remove them to the apiary; prepare a hive with one or more combs, containing a caged queen; close the entrance openings; uncover the observing glass, and set the box with the bees upon the frames; darken the top of the box with a cloth, and remove the slide from the bottom hole. The light in the hive will soon induce them to descend and occupy the frames. After the bees have gone below, close the hole in the box, letting it remain on the hive, and cover the observing glass. Keep the bees confined until half an hour before sunset on the

third day, when the queen must be liberated, and the bees allowed to fly. If no queen can be given them, they will raise a queen, if furnished with comb containing eggs and sealed brood. Three weeks thereafter, open the hive and remove the drone-comb, which is usually built while the swarm is queenless. Should this occur, however, near the close of the honey-gathering season, the drone-comb should be permitted to remain until the next spring.

Robber-bees, especially those coming from an unknown source, may be captured like wild bees. To do this, close up the hive which is being robbed, and confine the bees in it; then remove it to a new stand, and place in its stead another hive, arranged as described for capturing wild bees. After the robbers are caught, treat them like captured wild bees; return the first hive to its old stand, and allow the bees to fly.

MOVING BEES.

Bees, if removed at a time of the year when flying, must be taken a distance of two miles or more, or else many of them will return to their old stand.

If they are to be moved a short distance, or only to a different place in the apiary, it must be done during winter or in early spring, before the bees are flying, or it may be done in the following manner:—Confine the

bees to their hive, and move them to the place desired, and, before liberating them, drive them from their combs (see "Driving Bees.") Set the hive where you intend it shall stand, spread a sheet in front of the hive, and hive the bees into it like a natural swarm, and they will remain like a swarm.

To move bees a long distance, confine them to their hive; if in the common hive, blow in a little smoke, invert the hive, and fasten a wire screen over the opening. Should the weather be cool, a piece of thin open cloth may be used. If no sleigh or spring vehicle can be obtained, place the hives, mouth up, upon a bed of straw in a wagon, and drive slowly and carefully. In almost all movable-comb hives, the frames must be nailed fast, to keep them from swinging together.

To prepare a swarm in the Champion hive for removal, simply take off the cap and tack the wire cloth over the top. New swarms should be moved in the evening, after swarming, or they should be permitted to remain until their combs are finished. As soon as they arrive at the new apiary, the hives should be immediately set where they are to stand for the season, and the bees allowed to fly; and as soon as circumstances will permit, they should be transferred to the movable-comb hive.

TRANSFERRING BEES AND COMB FROM COMMON TO MOVABLE-COMB HIVES.

Bees may be transferred at any time during the year, yet nothing will be gained by doing so in the fall or winter ; nor should they be transferred until they have a fertile queen, which usually occurs three weeks after swarming.

All operations which produce a disturbance among the combs are most successfully performed when forage is abundant, for at such times the bees will readily repair the combs. The best time to transfer bees to the movable-comb hive is during the interval between the appearance of fruit tree flowers and swarming time ; during that period the operation is usually successful, even if performed by beginners.

Before beginning the job, the following utensils should be procured : A long knife, to cut the combs ; vessels to receive the honey ; a broad board or table, upon which to lay the combs ; a transfer board, about fifteen inches square ; a narrow hand saw, or piece of iron hoop, twenty inches long and two inches wide, sharpened at one end like a chisel, to separate the combs from the side of the common hive ; a hammer and strong chisel, to pry off one side of the hive ; some linen twine or strips of strong muslin, about half an inch wide, and a large feather.

OPERATION.—If the operation is to be performed when the weather is warm and the combs soft and tender, the bees should be driven from the hive, in the manner directed for “driving swarms.” After the bees have ascended into the box, fasten a piece of cloth or wire-cloth over its mouth, and leave it, mouth up, in the shade until needed. Now take the hive from which the bees have been driven, into the shade of a tree, several rods away from other bees; drive out the cross-sticks, pry off the top, separate the combs from one side of the hive, and pry off that side with the chisel, cutting the nails if necessary. Have the table placed near by, lay the transfer board upon it, then take two pieces of tape or strips of muslin, each long enough to tie around a frame, and lay them on the transfer board, about eight inches apart, cut out a worker-comb, and brush all the bees back with the feather; lay the comb on the transfer board, in such a manner that the ends of the tape extend beyond the edge of the comb; lay your frame upon the comb in such a manner that, when the comb is fitted into the frame, it will be in the same position it occupied when originally built—top side up. Mark inside the frame, and cut the comb at the side and top, to fit it, taking care not to cut the tape beneath it; let down the cross-bar to suit the depth of the comb, fastening it as before. Cut the comb a little large, and spring the frame around it; take the ends of the tape and tie them around the frame; raise the end

of the transfer-board, to bring the comb to an upright position, and suspend it in the new hive, placing over it a sheet to exclude strange bees. In this manner, fit in all pieces of worker-comb. If small, the edges may be dipped in melted wax, and several pieces attached, to fill up the frame. Combs slightly wavy may be sprung straight, or if too thick to let the frames come together, they should be shaved off with a sharp knife. Lay all drone-comb aside, to be put into honey boxes, or next to the top of outside frames, if nice and white, or to be melted into wax if brown and old. After about one-half of the combs are transferred, the bees from the comb may be brushed into the new hive. The combs containing brood should be placed together in the center of the new hive, and the empty combs outside of the brood.

In warm weather combs are frequently softened, so that they will not sustain their own weight; in such cases, they must be divided in the middle, and a cross-bar fastened in the frame beneath the upper half of the comb. If a shallow pan is placed beneath the combs in the new hive, a great deal of honey is occasionally obtained from the drippings; if no pan is used, a cloth must be laid under, or the bottom board cleaned with a wet cloth before the bees are put in, otherwise the running honey will attract robber-bees.

After all the combs are transferred, fill up the hive

with empty frames, close the side and upper passages ; spread a sheet before the hive and shake the bees upon it ; if they clog the entrance, separate them with a feather, until all have entered. In carrying, it is more convenient to leave off the cap ; keep the hive in an upright position, and carry it gently to the original stand.

The bees collected in the hive set there to receive them, may be emptied on a sheet in front of the new hive. Adjust the cap, shade the hive and contract the entrance so that the bees must enter singly.

If the weather is cool, and there is no liability to break the combs or spill the honey, I seldom drive the bees from the hive, thereby guarding against chilling the brood while they are being transferred.

If the combs in the hive are *old and tough*, and not freighted with honey, spread down a sheet a short distance from the hive, in the shade of a tree ; carry the hive gently to the sheet, lay it down on one side and blow in a little smoke. Place an empty hive where the old one stood ; blow more smoke into the hive on the sheet, raise it up almost six inches—mouth down—and drop it back on the sheet ; raise it quickly and drop it again at another place. Repeat this several times, until a number of bees have been jarred from the comb. Care must be taken to avoid crushing them. Set the hive aside and sprinkle the bees quickly with cold

water ; raise the corners of the sheet and shake them together ; set a box—mouth down—over them, and place two sticks under it, so as to raise it about two inches, in order to admit air.

If the combs are not old and tough, this cannot be done, for the combs might break from their attachment. Should they do so, proceed as if the bees had been driven out, taking care not to crush the queen in any operation. After one comb is transferred to the new hive, the bees from the next comb may be brushed into it. To guard against robber-bees entering either hive, keep a sheet over them.

In the operation of transferring, it will be well to protect the face by a head dress ; and to subdue the bees thoroughly at the start, keeping the smoke at hand, ready for use at any time if needed.

CHAPTER VII.

GENERAL MANAGEMENT OF BEES.



HANDLING BEES.

- ✓ And lastly—for here my remarks ought to cease—
 The bees, as a nation, are bent upon peace ;
 You are ready to question this statement I know,
 And to ask why we carry our slings where we go.

We carry our stings, not on any pretense
 For aggressive attack, but in pure self-defence ;
 We meddle with no one, and only repel
 Assailants who will not in peace with us dwell. —SUNSHINE.

Many persons desirous of obtaining the large profits resulting from successful bee-keeping, would readily engage in the business were it not for the fear of being stung. Many intelligent men, when viewing the “Bee-charmer, clad in a ‘coat of many colors,’ ” think the whole pursuit is connected with similar performances ; while the ignorant, standing with eyes and mouths open, come to the conclusion that the business of keep-

ing a few stands of bees is a mystical science or learned secret that they will never be able to comprehend, much less practice.

In the following lines we give the true explanation of all the "receipts for taming bees," "secrets," and "bee-charm drugs," which have been sold to a confiding public, and the whole of the alleged art of "charming and taming bees :"

1st. Bees filled with honey or other "liquid sweets," will not sting, unless hurt.

2d. Bees, when alarmed, will fill themselves from any liquid sweets given them, or from the honey contained in their combs.

Bees can be alarmed either by blowing a cloud of smoke upon them, or by confining them to their hive, and rapping on it for a short time.

Before a swarm issues from its hive, the bees prepare for their flight by filling themselves with honey ; and when thus filled, they are very docile. Frequently other bees, not being in the hive to fill themselves, join the swarm, and if sprinkled with a little sweetened water, until satisfied, we can shake and brush them about, drive them into a basket or box, look among them for the queen, or perform any operation, and they will not sting unless we compel them to do so by hurting them.

In performing any operation in the hive, such as removing combs, making examinations of the interior, transferring queen-cells, or taking off full honey-boxes, etc., the bees are usually subdued with smoke from a roll of *cotton* rags. This roll should be at least one inch in diameter, and wrapped with thread at intervals of an inch, so as to burn and *not blaze*. To use it, light one end, and after it is fairly ignited, extinguish the flame and blow the smoke into the hive through the entrance, until a loud humming is heard, which is the usual sign that the bees are aroused and filling themselves with honey in good earnest; wait a few minutes, and blow in a few more whiffs of smoke, remove the cap and boxes, blow a little smoke on the bees above, and any operation may then be performed. On the approach of autumn, the bees are not so easily controlled, the honey in the hive being nearly all capped over, and they must be allowed more time to fill themselves. It is also more difficult to subdue them at night or when the weather is cool, or when raising queens. To quiet the bees on such occasions, some recommend the addition of tobacco, enclosed in the rags. That it is effective may be judged from the fact that if a little more tobacco smoke than is needed is blown into the hive, many bees will drop from their combs. The use of tobacco is very objectionable, being injurious to the bees, giving a disagreeable scent to the combs, and a bad flavor to the honey.

Many persons affirm that honey injured by the fumes of tobacco, when eaten by the bees, produces dysentery. Bees separated from their stores, or occupying combs without honey, should be sprinkled with sweetened water; diluted honey would answer the purpose far better, but the scent would attract other bees, which may prove hostile. If other stocks are close and the bees interfere with each other, blow a little smoke in the entrance of each hive.

Beginners and timid persons may use a veil over the face, until they obtain courage and experience, when the use of it can be dispensed with.

This face-protecting veil should be made of coarse *black* millinet,—one yard is sufficient,—fasten the ends together, run a rubber string through the holes near the edge, draw it up until it will fit around the crown of a hat. The rim of the hat keeps the veil from the face, and the lower end can be tucked in about the neck; when not in use it may be taken from the hat, folded and carried in the vest pocket. If the article is coarse, it will be cool and comfortable, and if black it will not produce a blur before the eyes. The hands of the operator will need no protection, as bees will not sting them unless pinched. As the cost of millinet is but little, several of these veils should be on hand to accommodate visitors, when about to visit the apiary.

By improper management, such as jarring the hive

and combs, or quick motions, the anger of bees may be excited. The smell of sweaty persons and animals, —any rapid motions or rough handling; running to, from, or past the hive, and the slow, warm human breath is offensive to them, especially the latter; the smell of their poison, also, arising from a crushed bee, or from the sting inflicted in the clothing of the operator, provokes their anger. All these things should be avoided.

In approaching a swarm of bees, walk boldly up to the entrance, coming from the rear of the hive, and administer the smoke, even if surrounded by numbers of bees, buzzing about your ears, don't strike at them, if they alight on your face, brush them off *gently*, if they get too *thick* for you, don't run wildly away, for that would cause them to follow you; before they sting, their peaceful buzzing is changed to a finer or sharper sound, and then the sting can be avoided, by keeping your head bowed down and your eyes protected with your hands. Their aim is generally directed toward the eye, and they will sting other parts of the body only when furiously enraged. Should the bees refuse to leave, walk quietly around the corner of a building, or in the shade of a tree, or hide your face in thick bushes, or lay flat on the ground, with face down in the grass or weeds, and they will soon leave you.

If stung, remove the sting, as quickly as possible,

avoid all rubbing, however severe the smarting or itching may be, and bathe the part in cold water. Harts-horn, (*aqua ammonia*), if quickly applied, will often prevent swelling ; when the wound is bathed with it, the volatile properties of the ammonia will reduce the poison, which will escape with it.

While some persons suffer more from the stings of bees than others, still others, and especially those who have been stung a number of times, feel little or no pain.

If any operation is to be performed on a hive, requiring several minutes of time, the hive should be carried from its stand a rod or more while the bees are flying, as the returning bees, not being subdued, may feel inclined to resist your operations. If carried in the shade, or away from the principal line of flight, other bees will be less liable to interfere.

BEE 'ROBBERY.

Bees seldom rob when there is plenty of forage, or when under the management of an able bee-keeper who guards against it. This thieving habit is generally caused by the exposure of honey or other sweets, so that bees can get a taste of it ; and if they become accustomed to obtaining their honey without searching the field, they will try to enter every colony in the apiary—especially in early spring or in the fall, after

natural forage becomes scarce—and weak and queenless colonies will usually suffer. When a hive is being robbed, an unusual agitation of the bees near the entrance may be noticed; bees will be seen to run and quickly drag others away; this fighting may increase, and many bees be killed, or, if the robbers overpower the other bees and enter their hive, a steady stream of flying bees can be seen, going from this hive to another or elsewhere, and back again. To ascertain to which hive the robbers belong, take some flour and sprinkle on them as they pass out and in, then look for the flour-backs at the entrance of your other hives. If in the movable-comb hive, lift out a frame containing honey, shave off the caps, letting some of the honey run, and return the comb; if in the common hive, blow in some smoke; this will give them trouble at home, and will often effect a cure. Should you fail to find the home of the robbers, sprinkle them with cold water at the entrance of the hive they are robbing; diminish the entrance so that only one bee can enter at a time, thus enabling the colony to defend itself; or lean a board against the front of the hive. If the robbers should come from a tree in the forest they may be captured as directed. The bottom of the Champion hive, being inclined, greatly favors the defence of the colony against robbers, and when used, but little trouble is experienced, as by moving the entrance-regulators towards the centre, the entrance can instantly be diminished to the size required.

FEEDING BEES

Bees should be reared so as to give the bee-keeper some surplus honey, instead of requiring to be fed by him, and if the foregoing directions are observed, but few stocks will need feeding. The feeding should be attended to, when necessary, at the proper time; by the use of movable-comb hives, deficient colonies may be supplied with one comb or more, containing honey, from a colony having a surplus. Enough food should be furnished them in the fall to last them until fruit trees begin to bloom in the spring; if done in the beginning of October, the bees will cap over the honey before cold weather begins; uncapped honey absorbs impurities, often sours in the cells, dampens the air in the hive, and frequently causes dysentery among the bees. If the needy colony is in the Champion hive, any partly filled box of honey may be placed upon the hive; the large openings from every comb in the hive and the direct communication induces them to take possession of its contents readily, even during freezing weather. Bees, in common hives, or in hives having a honey board or air space between the frame and the box, would sooner starve than enter a honey box in cold weather. If needy stocks are not thoroughly fed in the fall, or if an unfavorable summer is followed by a severe winter and late spring, feeding may become necessary in the spring *“In the spring the prudent*

bee-keeper will no more neglect to feed his destitute colonies, than to provide for his own table."—L. L. LANGSTRATH. "If the spring is not favorable to bees, they should be fed, because that is the season of their greatest expenditure of honey for feeding their young. Having plenty at that time enables them to yield early and strong swarms."—WILDMAN.

The feeding of bees should be done inside the hive or above their combs if there are passages from below ; they should never be fed outside the hive, for that will always teach them the habit of robbing. If honey stored in frames is retained for such emergencies, it is by far the best method ; but if all the honey in frames or boxes has been imprudently sold or used, the best feed that can be given them is strained honey. In the fall, if the needy stocks are in the movable-comb hive, remove two or three empty combs from each, lay them on a board or table and sprinkle warm honey over the upper half of the comb, until the cells are about two-thirds full, let it cool for a short time, then turn it over and fill the upper half of the other side, replace the combs in the hive, and feed in the chamber a few days, until the cells are capped over.

To feed bees successfully above their combs in their hive, we have been at great expense and loss of time to perfect a feeder ; and at last we succeeded in perfecting an air pressure bee feeder, with which the bees can be

fed from the outside, in the top of the hive, away from robber-bees and without disturbing the bees in the least ; it works equally well when used to furnish bees with honey, syrup or water.

The importance of feeding is only fully realized when we bear in mind that from a pound of sugar syrup, costing only about six cents, as much comb will be built as from a pound of honey costing thirty cents. To make syrup for feeding, take *brown* sugar, and to every pound of it add one pint of boiling water, boil the whole for a few minutes and skim.

If bees must be fed in winter, owing to neglect in the fall, pour the honey directly into the combs, if the stocks are in the movable-comb hive ; if in the common hive, remove it to a room, invert it, cut out enough comb to admit a small plate filled with honey, place it near the bees and tie a cloth over the mouth of the hive to confine the bees ; or a small bag filled with honey and sugar may be suspended in the hive from above, cutting away enough comb to admit it to the cluster of bees.

Spring feeding should only be done from above, pour as much honey in the feed-box as they will consume, without carrying it below and storing it in the comb, where it would diminish the space for breeding. If comb-building is desired, they should be fed liberally. If West India honey is to be used for feeding,

it should be heated and skimmed to remove the impurities. If honey cannot be obtained for feeding, make a syrup. This is the best substitute for honey, to feed bees, but it should only be used sparingly in fall and winter ; if too much of it is stored in the combs, it will sometimes sour or granulate, and become worse than useless to the bees. If a swarm is apparently dead from starvation, they are frequently revived by sprinkling them with sugar-water or diluted honey, slightly warmed, and then letting the hive stand in a warm room for a few hours. Plain white candy is frequently used as bee food, but as they cannot subsist on that alone, it should be given before their honey is quite consumed, and it will greatly lengthen out their stores. It may be fed by laying it across the frames or combs, or by pushing it down between them. Contract the entrance when feeding to guard against robbers.

Water is indispensable to bees, when raising brood or building comb, and every bee-keeper should see that his bees can get it without going far for it ; to bees, *time is honey*, and to the bee-keeper, *honey is money*. Many apiaries are not possessed of running water. In such a case, I would recommend that a trough, about six feet long, eight or ten inches wide and eight inches deep, be made of a log, and filled with stones about as large as a hen's egg. Fill the trough daily with water, or set a barrel filled with water on one end of it, and let it trickle into the trough, thus continually renewing

the water. A table spoonful of salt should be thrown into it once a week, and poultry must be excluded from drinking from it. The additional profit will pay for this work.

VENTILATION OF HIVES.

Ventilation is indispensable to every bee-hive, and if it is not supplied by artificial means, it is effected by the bees with very great labor and loss of time. If a strong colony is examined on a warm day, a large number of bees can be seen with head turned toward the hive, fanning cool air into it with their wings; another large number can also be found inside the hive, fanning out the impure air, and when these laborers are tired they are relieved by others. That such duties are extremely laborious and exhaustive of the strength of the bees, is evident without further demonstration, and instead of allowing the bees to perform this labor, the hive must be ventilated by artificial means; the bee-keeper will receive his reward in a large increase of honey, as all those bees which would otherwise be engaged in ventilating the hive will turn their attention to honey gathering.

In warm weather, nearly one-half of the bees will cluster outside on some hives, spending their time in idleness, being forced to do so by a suffocating heat in the hive, which they are not able to remove with all

their fanning. This occasions great loss to the bee-keeper, as all this takes place when the honey season is at its height. In the greater part of the hives now in use, this cannot be prevented. In the Champion hives, a current of air can be made to pass from the entrance to the top of the hive, and all heated or foul air allowed to escape by opening the fly holes, giving at the same time a more direct road to the honey boxes.

Our feeder, heretofore named, is arranged to use also as a ventilator in the top of the hive directly over the centre of the bee cluster; with it, ventilation is obtained from the *centre* of the hive, and so arranged that no cold current can pass; it admits air without light, and is never glued by the bees. Ventilation can be regulated or entirely stopped by a simple turn like a faucet.

If a hive is thoroughly ventilated, or made with double sides, thus forming a dead air space around the entire colony, which prevents the warm rays of the sun from penetrating to the interior of the hive, the bees will not cluster outside, but remain at their labor, gathering a larger amount of honey; while in some hives, they lose the best chances for so doing by being interrupted by suffocating heat.

In early spring, or late in the fall, it is necessary to diminish the size of the entrance, in order to retain the heat necessary for breeding. By sliding the entrance-

regulating sections, the entrance may be enlarged or diminished at will without disturbing the bees.

Ventilation most thorough our domicils share,
 No one need teach us the worth of fresh air ;
 For we could not live, as we've heard people do,
 In close rooms, where no health-giving breeze can pass through.

THE BEE MOTH.

Of all the enemies of bees, the bee moth is the most formidable. "They are a paltry-looking, insignificant, little gray-haired, pestilent race of wax-and-honey-eating and bee-destroying rascals." Yet their depredations are usually first caused by some disarrangement in the bee-family of the hive. Many persons believe, and are encouraged in their belief by unprincipled bee-hive venders, that the *worm* enters the hive ; or that they have a *moth-proof* hive. A hive may be *cast* of iron or glass, and yet the moth-miller which produces the moth, will enter where a bee does. The moth hatches from an egg in or adjacent to the interior of the hive ; the eggs are laid by a winged insect, resembling in color a sliver from a weather-beaten fence-rail. During the day she may be found concealed in the vicinity of hives ; near sun-down she is flying near the entrance, and if she gains admittance will at once endeavor to find a crevice containing the litter of the hive and deposit a large number of eggs. The litter of the hive

seems to be her first choice, especially if in a crevice, as it affords the young worms the first food and protection ; if no litter is found, any comb not covered with bees will be selected by her. As soon as the worm hatches, it begins to eat wax, bee-bread and brood, spinning a silky film in all its movements, and if the worms are numerous, the film often fills the hive like the cobweb of the spider. After three weeks of unceasing depredation, the worm has obtained its growth, and seeks a crevice or other secure place to spin its cocoon, wherein to undergo the change to a perfect winged moth-miller.

There can be no moth-proof hive ; the miller is governed by nature and must lay her eggs somewhere, and she is usually successful in obtaining admission to the hive. The usual indications of the presence of the moth in a hive, are cuttings of wax mixed with *black specks* "*resembling grains of gunpowder,*" the excrements of the moth. Strong stocks are a sure guard against the moth ; but while they overpower the moth by numbers, *proper* mechanical devices may overcome it to a great extent, turning the attention of the bees, engaged in constant battle with the moth, to honey gathering. In the common hive, hollow elder splits are laid on the bottom or under the edge of the hive, under which the moths usually crawl to spin their cocoon after they have done the mischief ; by this means

only the coming or second generation is destroyed. A large number of patent moth-traps are constructed, which only answer the same purpose, while the litter of the hive, and with it the brood of the moth, should be under the control of the bee-keeper ; this is effected in the Champion hive, in a cheap and simple manner, by offering to the moth-miller a crevice filled with the litter of the hive at the very entrance. This moth-groove must be cleaned once a week, or it may become a moth-nursery instead of a moth-destroyer. Take a piece of lath, eighteen inches long, and thick enough to fit the groove, and push it through the groove once a week ; by it, all the litter of the hive, moth, brood and other filth is removed. Should want of time or inclination prevent the bee-keeper from performing this operation regularly, the moth-groove should be filled with a piece of lath ; the inclined bottom will then conduct all litter from the hive, and if strong stocks only,—each having a fertile queen,—are kept, the moth produces no serious mischief. The moth-worms make their appearance during the month of April, and a second generation in August ; during these months more attention should be paid to their destruction than at any other time.

Large apiaries are less troubled with moth than small ones, their depredations being divided among the large number of colonies. A large number of moth-millers may be drowned by setting well-sweetened water, mixed

with a little vinegar or sweetened whey, in white earthen dishes, among the hives during the night; these dishes must be removed early in the morning, or else many bees may be drowned in like manner. If small birds, especially the little wren, are encouraged to build their nests in the vicinity of apiaries,—by putting up boxes, made four inches square, with an entrance hole one and a-half inches wide,—many moths and millers will be caught and devoured by them.

OTHER ENEMIES OF THE BEE.

Roaches and ants seek an abode in hives through the openings of improperly-made joints. Hunt up their hillock, spade into it and pour warm soap-suds or lime-water over it. The places frequented in the hive, and especially the entrance crevices, should be moistened with spirits of turpentine, or with the juice of tansy, catnip or black walnut leaves, which will usually suffice to keep them away. Mice will enter the hive if they find an opening large enough to admit them. They eat some of the comb and bees, but cause the most damage by building nests within the hives; by diminishing the entrance so as to admit but one bee at once, and closing or covering all other openings with wire-cloth, they are excluded. Spiders catch bees in their nets, and should not be allowed to exist in the vicinity of the hives.

STRENGTHENING WEAK COLONIES.

Colonies that are reduced in number, either by loss of queen or otherwise, should be strengthened, so that all colonies in the apiary are of almost equal strength. Take combs containing bees just hatching, from a strong colony, brush back all the bees with a feather, and insert the combs in the weak colony. Weak colonies in common hives may be strengthened by setting the weak colony on the stand of a strong stock; this should only be performed when forage is abundant, or the bees, thrown into a strange hive, may be inclined to quarrel.

DISEASES OF BEES.

The honey-bee is subject to but few diseases, compared with any other living creature; there are actually but two distinct forms of disease known to which bees in this country are subject, viz: *dysentery* and *foul brood*.

Dysentery may be found in some hives during the latter part of winter, and in the spring; the usual signs are: the bees discharge their excrements over their combs, over the hives, and in fact at any place where they chance to be; its color soon changes from its natural yellow to a darker, muddy appearance, producing a peculiar offensive smell. The movements of the bees are slow, and they appear weak, have a dark, soiled color and decrease unusually fast. Sour honey,

or long confinement,—during which the state of the weather or some disturbance, keeps them active, and causes them to take a larger amount of honey than usual,—may be considered a cause of dysentery.

Feeding them on prepared syrup also has a tendency to cause this disease, especially if it, or even honey, is fed so late in the season that the bees cannot cap it over, and the moisture of the hive, if imperfectly ventilated, will greatly aid in producing fermentation.

If a colony is found to be afflicted with dysentery, feed them with pure honey, and after they have ceased discharging, clean the hive of all impurities, substituting clean combs for the soiled ones if possible; continue feeding clean honey, and allow the bees to fly whenever possible. If the disease is detected in winter, make a box, front and top of wire-cloth, adjust it to the entrance of the hive in such a manner, that the bees can enter it, yet have no other place to leave the hive. Remove the whole to a warm room, so that the bees will be induced to leave the hive and enter the box; feed on pure honey and clean every part of the hive as much as possible.

Foul-brood has never been known to exist west of Ohio; western bee-keepers have been careful not to purchase bees from districts infested with this contagious disease. Foul-brood, or brood-rot, has more effect upon the brood of a colony than the mature bees; the

caps of the sealed brood appear indented and shrivelled, and the young bees and larvæ in unsealed cells become putrid, emitting a disagreeable stench, perceivable several feet from the hive. Its real cause is yet unknown, but it is usually introduced from other colonies infested with the disease, being contagious; combs or honey taken from such colonies are often the conveying agents. Drive the bees from their combs into a box, confine them for two days, till free from the honey taken with them; cut all the brood and honey from the comb, subject the remaining comb to the fumes of sulphur and camphor, laid on hot coals, put them and the bees into a new hive, and feed with pure honey. The honey may be purified by thorough boiling and skimming.

WINTERING BEES.

Success in this operation depends, to a great extent, on the proper preparation of a colony for wintering. In the first days of October, ascertain the exact condition of every colony; if any are found weak in numbers, they should be made strong by uniting two or more colonies; *strong colonies consume less honey than small ones.* Swarms of the current year are usually deficient in bee-bread, and one of their combs should be exchanged with a comb from an old colony, which generally has a surplus of it. The weight of such swarms, without the hive, should be at least thirty pounds.

Colonies having combs three or four years old, should weigh, without the hive, at least forty-five pounds ; the combs of such colonies usually have an excess of bee-bread, greatly adding to their weight. Should there be a deficiency of stores in any hive, it should be supplied from hives that have enough without it ; or such stocks must be fed until they obtain the named weight. (See "Feeding.")

In the common hive, where an examination is impossible, the amount may be judged by lifting the hive ; always bearing in mind, that old combs are heavier. A very large allowance must also be made for the bee-bread stored therein.

The middle combs are usually used for breeding, and the honey is stored in side combs ; and as bees cluster near the middle combs, the side combs should be inserted near the middle, so that bees may cluster near their stores, and not be compelled to search for them in the extremities of the hive. If such combs are full they should be placed on each side of the cluster of bees. Bees need empty combs to cluster upon, as combs filled with honey are better conductors of cold, and hence, too cold for winter clustering.

In upright hives, such an exchange will seldom be necessary ; the honey being stored above, the bees cluster directly beneath it on the empty part of the comb, and move further up as the honey is consumed.

Being thus accommodated with empty comb; and honey from above, kept warm by the rising heat from the bees, breeding begins fully one month sooner.

Each comb should have a hole an inch in diameter cut through it, about five inches from its top, made with a long pen-knife, to enable the bees to reach their stores in adjoining combs without the danger of freezing, by leaving the cluster to pass around the edge of the frame. Combs of sufficient depth, in frames with central bars, as in the Champion hive, will not need cutting, as the bees generally leave openings directly above the central bars. If the hives are to be wintered in the open air, the entrance should be diminished, to exclude mice and retain as much of the heat of the heat of the hive as possible.

The vapor, arising from the breath of the bees, causes moisture in the hive, and, if not allowed to escape, or is not absorbed in some way, it will freeze, producing frost on the combs and inner side of the hive; on warm days during winter, the frost in the hive frequently melts, the water running over the bees and from the entrance, and during the night the water is changed to ice and the bees are frequently a *solid frozen cluster*.

To avoid this, *upward* ventilation should be furnished as soon as freezing weather begins. In the Champion hive, remove the second story, place the roof on the

lower part of the hive, and use one of our " Combined Feeders and Hive Ventilators " in the centre of the roof; this will allow all moisture and foul air to escape, keeping the combs dry and free from frost, and yet will allow the foul air to pass off without causing cold currents in the hive.

Cold winds carry away more warmth from the hive than steady cold weather. A close board fence on the north and west sides of the apiary, gives some protection, yet the bees are greatly benefitted by setting corn-fodder around the hive, keeping the entrance uncovered, but shaded by a piece of board leaned over it. To shut up the hive entirely is objectionable; bees should be allowed to fly and discharge their fæces. Bees will never discharge their fæces in the hive unless they are diseased. If the ground is covered with snow many bees may perish in it, but in many cases can save themselves, if straw or hay is spread in front of the hives.

After many carefully conducted experiments in wintering bees, I have found the following the best method:

Set the hives, properly prepared for wintering, on the south side of a fence or building as soon as steady winter has set in; set the hives about one foot from the fence, and each hive about one foot from the next one, pack hay or straw behind, between and over the hives, and lean a broad board against the front of the

hive ; the board will shade the entrance, this shading will retard their flying except on real warm sunny days; on such days drop the board, forming a floor in front of the hive and allow the bees a free flight. These flights are very beneficial, as the bees discharge their fæces and carry in *water*, if in the month of January or later, to prepare food for the brood.

WINTERING BEES IN CELLARS OR SPECIAL HOUSES.

If bees can be wintered in a cellar, an equal temperature can be obtained, thus keeping the bees inactive and lessening the consumption of honey. A cellar, adapted to this purpose should be cool, dark and dry ; if the entire cellar cannot be used for the bees alone, the part least disturbed may be separated from the rest by a partition or curtain, so that the light may not induce them to fly when the door is opened. If the cellar is not perfectly dry, or a large number of hives are crowded into a small space, the combs may become mouldy ; to guard against this to some extent, construct a ventilation tube by fastening four boards together, and arrange it in the cellar window or through the door. The hives should be elevated from the floor by scantling, and if a larger number than can be placed on the floor are to be wintered in it, shelves may be constructed. The interior of the hives should be prepared as for wintering in the open air ; as soon

as winter has fairly opened, the hives should be taken in, and not sooner. Common hives may be *inverted*, and a piece of *thin* muslin or wire-cloth fastened over the openings. During the winter, the hives should be examined occasionally, to see that the combs are not getting mouldy ; should the humming and uneasy motions of the bees give indication that the cellar is too warm, it should be cooled ; and if this cannot be effected by opening the door and window, the uneasy stock should be carried outside until the bees become quiet, when it may be returned.

Special Houses are sometimes built, when a cellar cannot be used. The building is weather-boarded outside and boarded within, and the space between filled with saw-dust, tan-bark or straw ; the roof is also boarded inside, and the cavity between filled with straw or saw-dust. To secure a more even temperature, a pit two or three feet deep is dug inside ; and the bees are wintered in it as in a cellar.

Ground Pits are also made use of in the absence of either of the foregoing. Select a *perfectly dry* spot, dig a pit or ditch six inches deeper and wider than the height and width of the hives ; drain this ditch to secure perfect dryness ; lay down four-inch scantling, and upon it place your hives, arrange a pole over the middle of the ditch, rested in forked limbs, and from the pole lay short boards to each side of the ditch in

such a manner as to form a roof ; make a tube for each hive by nailing the edges of four laths together, insert them so that one end reaches down to the middle of the hive, the other end projecting outside, and cover the whole with straw about a foot thick, and over it place some earth to retain it in place. As soon as the warm days of spring approach, the hives should be set on their summer stand, beginning with the strongest colony, and as soon as they have marked their course, more may be set out until all have their summer stand ; if no more freezing weather occurs, upward ventilation should be checked, and the entrance contracted to retain the warmth of the hive, and to enable each colony to guard against robber-bees.

MONTHLY MANAGEMENT OF BEES.

The inexperienced bee-keeper will find in the following articles brief directions as to what time the various operations are to be performed ; varying a little, of course, with forward, early, or late seasons.

MANAGEMENT FOR JANUARY.—If the colonies have received the proper attention in the fall, but little will have to be done to bees in this month. On warm days remove the shading-board from the entrance of such colonies as are wintered in the open air, allowing the bees to fly and discharge their fæces. Keep the entrances, especially those of common hives, free from

dead bees, ice and snow, else the bees may be smothered. See that strong stocks have sufficient upward ventilation, or water and frost may collect in the hive, causing mouldy comb or the death of the bees. Make good, substantial movable-comb hives from *seasoned* lumber, for use in the spring; and during the long winter evenings read this, and other books on the subject, until most of their contents are committed to memory.

FEBRUARY.—The directions given for January management, are applicable to that for this month. If any stocks are to be moved, it should be done this month. "Proper and judicious bee-culture forbids feeding in cold weather," yet, needy stocks in common hives may be supplied with honey or a suitable substitute. (See "Feeding.") In movable-comb hives, give needy stocks frames of honey taken from heavy colonies. Strong colonies will begin to breed. In mild seasons, bees will fly freely this month, and should be supplied with rye-meal. (See "Pollen, or Bee Bread.") This should be given early, before natural pollen can be obtained, else the bees will not accept it.

MARCH.—In the Northern States, the reign of winter still continues, and as long as this is the case, the directions for the previous months must be observed. But if the weather is pleasant, and appearances indicate the close of winter, the bees should be removed from

the cellar, or other wintering structure and set on the summer stand ; if, however, occasional freezing occurs, the moisture-absorbing material should remain in the hive. Continue the flour feeding as a substitute for pollen. Robbing will be attempted, and must be guarded against, by contracting the entrance.

APRIL.—If bees were not removed the previous month, the change must be made now. Remove the moisture-absorbing material from the top of the frames, and cover the openings in the tops, to retain the heat necessary for breeding. In this month, feeding will frequently become necessary in many colonies, as the activity of the bees and rapidly maturing brood increases the demand for honey ; and colonies that are deficient in honey must be fed as regularly as horses and cattle, or the whole colony may die of starvation. The fact that winter is over and that the bees are flying briskly is not an indication that they obtain their supplies outside ; they must wait until flowers appear. The supply of rye meal must be continued until the bees can obtain it abroad, which is ordinarily in this month. If any hive needs cleaning or repairing, remove the combs and bees to a new hive, cut out all drone-comb, unless a large number of pure Italian drones are desired. Ascertain the exact condition of every colony, whether queenless or not. (See "Loss of Queen.") Unite weak and queenless colonies. Clean the bottom-

board of common hives and destroy the moths, and guard against robbing.

MAY.—Bees will now begin to gather much honey, and usually begin to work in boxes before swarming. Prepare the boxes before putting them on the hive, by dipping one edge of comb in melted bees-wax, then stick it to the top of the box before the melted wax gets cold. Enlarge the entrance by moving the slides; clean the moth-grooves regularly, and destroy the moth. About the tenth of this month, examine some strong colony, and if sealed drone-brood or mature drones are found, preparations may be made for nucleus swarming, by starting queen-cells. (See "Artificial Swarming.") Bees and combs may be transferred to movable-comb hives. Strong stocks, and especially Italians, may swarm near the close of this month; have everything ready.

JUNE.—This is the principal swarming month, in such parts of the country as have a full supply of white clover forage, and if natural swarming is allowed, close attention from the bee-keeper is needed. All operations of artificial swarming, and the transferring of bees may be performed. Prevent over-swarming by removing all queen-cells *except one*. Open the upper fly-holes to ventilate the hive and give bees the shortest road to the honey-boxes. Raise up boxes nearly full, place the empty boxes under them. Remove full boxes

as soon as finished. Sow buckwheat during this month for fall pasturage. Destroy the moths.

JULY.—All after swarms should be returned to the parent stock, or several of them united, or provided with combs taken from strong stocks or from the scrap-box. The entrance should be opened to its full size, and the hives shaded. If the weather is favorable and forage abundant, strong colonies will store some choice honey below, and sometimes so much that the space for breeding will be crowded; the outside frame, if full, should be removed and an empty frame inserted near the middle of the hive; preserve the honey in the frames until fall, as it may be needed for feeding or other purposes in the apiary. A better way is to remove the honey with the honey extractor, even if a part of the comb is filled with brood, and instead of inserting an empty *frame* in the middle of the hive, a frame filled with comb can be inserted.

Weak colonies should be strengthened by furnishing them with comb containing brood nearly hatching. Honey boxes should be removed as fast as filled; a few days delay may greatly reduce the amount of box-honey. To induce bees to commence work immediately in the second set of boxes, put in large pieces of white comb, or elevate the full boxes.

The Linden or basswood blooms during this month, and during its blooming, bees gather honey faster than

they can find room to store it; but if the honey extractor is used every one or two days, an immense amount of choice honey is obtained.

AUGUST.—The moth and robber-bees are very destructive in this month, and therefore the greatest attention is necessary to prevent their depredations. Surplus honey should be removed early in the morning or after sundown, exposing the honey as little as possible. All clover honey should be taken from the hive and empty boxes with combs, put on, to receive the darker colored buckwheat honey.

If situated in the vicinity of buckwheat fields, swarms sometimes issue, and be made into prime stocks by furnishing them with one or more combs and frames filled with honey. Wild bees may be hunted in this month, and lines obtained from buckwheat fields. During this month Italian queens may be introduced.

In localities where "Golden Rod" grows in abundance, natural swarms will issue as freely as in the month of June; and such swarms will not only fill their hive, but will usually yield a surplus.

SEPTEMBER.—A large quantity of honey is frequently gathered during this month, from buckwheat, golden rod, and other late flowers, but the bees are not disposed to store it in boxes so late in the season. They are not able to accumulate the necessary neat for comb-building, unless the boxes have large openings and close

connections with the breeding apartment. But if empty combs, built in the main hive, are given them, they will fill them very rapidly. Use the honey extractor regularly, or else the brood combs become filled with honey, preventing breeding; it should be remembered that during this and the next month, the bees needed for wintering are to be reared. If the breeding part of the hives becomes filled with honey, breeding cannot take place, and only old bees are taken into winter quarters which usually die before young bees are raised the following year, and a re-occurrence of that mysterious bee disease would be the result, viz: plenty of honey, yet no bees in the hive in the following spring.

Should any young stock be deficient in bee-bread, exchange a comb or two with an old stock that has an excess; always brush the bees back into their hive, to insure the safety of the queen. If any colony is yet in possession of its drones, it should be examined to ascertain whether it is queenless or not. Diminish the size of the entrance.

OCTOBER.—Honey gathering has now ceased, and all weak or light stocks must be fed, or united in the first days of this month. Colonies of observing hives may be united with queenless stocks, and nuclæ with other colonies.

Some full combs should be placed near the centre of

the hive, and the upward communications closed, unless feeding is done above. The space between the glass and cover should be filled with rags or hay.

NOVEMBER.—All preparations for wintering should be completed by the last of October; but if the bee-keeper has been prevented from so doing, the first warm days in this month should be used to put them in proper condition for wintering. As soon as freezing weather begins, all stocks should have upward ventilation, and moisture-absorbing material should be placed over the frame; and when winter sets in, all hives, intended to be wintered in the cellar, house, or ground, should be placed in their winter quarters. Colonies wintered in the open air, should be sheltered from cold winds, by straw, fodder or corn-stalks.

DECEMBER.—In this month, all the directions given for January, are to be observed, and the bees kept as undisturbed as possible.

SPECIAL MANAGEMENT FOR A LARGE YIELD OF HONEY.

In localities where the honey harvest is only of short duration, or spasmonic, coming at intervals of five or more weeks, a large yield of honey may be obtained by the use of the honey extractor, the bee-feeder, and the following management:

In the first part, hives are needed that can be en-

larged to give room for two common sized colonies, and again contracted or reduced to be of the usual breeding size, such as the Champion hive, No. 2, in which it is done by the use of a close fitting division board ; or as in Champion hive, No. 3, which can be united and re-divided.

Secondly. We must know about *what time* the forage crop, of which we wish to avail ourself, comes in bloom : whether white clover, about the first of June, linden or basswood about the 10th of July, golden rod about the middle of August, or a special crop of buckwheat in bloom about the 20th of September, in such localities where the absence of frost allows it to bloom that late.

Now to the management. About five or six weeks prior to the time at which the forage crop of which you wish to avail yourself comes in bloom, stimulate breeding in your hives by feeding each colony about 8 oz. of syrup every evening, until about two weeks prior to the blooming of the forage, then reduce the number of your colonies to one-half by uniting every two into one—removing or caging both queens. If the bees are in a No. 2 Champion hive, one colony in each side with a division board between, unite them by removing the partition. If in a No. 3 Champion hive, one colony in each story, either standing on a separate stand, or setting one above the other with a tin partition be-

tween, unite them by setting one on top of the other without a partition. The object of this management is, by judicious feeding we rear a large force of workers of sufficient age to gather honey about the time forage comes in bloom ; and by uniting and caging the queens, all the brood in the hive will be capped about the time forage comes in bloom, and the bees needed to carry pollen and water for the open brood are turned to honey gathering. As soon as the forage is in bloom, use the extractor as often as one-half of the combs are filled ; cut out all the queen cells one week after uniting them, else they may swarm. About the time forage decreases, separate the colonies, liberate the queens, and repeat the management as above directed.

By management of bees as above directed, very frequently as much as five hundred pounds of surplus honey per colony has been obtained ; and we have reports that as much as one thousand pounds per colony have been obtained.

CHAPTER VIII.

MISCELLANEOUS ARTICLES.



TO PRESERVE HONEY COMBS FROM THE MOTH WORM.

Combs, whether empty or filled, are subject to destruction by the moth, whenever away from the protection of the bees. Combs may appear sound at first sight, when, upon close examination, a number of holes—eaten edgewise through the comb—may be discovered. Boxes of honey removed early in the season, should frequently receive a thorough examination, and if small white lines of fine powder are discovered on the combs, they should be smoked with burning sulphur. Dip a roll of cotton rags into melted brimstone, place it on a sheet iron pan, put the honey-boxes and comb over and around it, in such a manner that the smoke can enter them, ignite the rags and cover the whole with a large box. After fumigation, empty combs should be preserved in some place where the

millers cannot get on them, or a second smoking may be necessary.

AMUSEMENTS WITH BEES.

Various amusing feats may be performed by obtaining a queen of a colony. Take fine wire cloth and form it into a small queen-cage; confine the queen in this cage, and pin it to your whiskers, and the whole swarm will soon cluster around the queen. Or the queen may be secured in a hat or cap, upon which the bees will quietly cluster.

If the bees are thoroughly subdued, they may even be taken in the mouth, and they will not sting if the performer will hold his breath, and guard against pressing them. Should he be stung, swelling may be prevented by occasionally taking a piece of *carbonate ammonia*, about the size of a pea; by so doing the system will become charged with counteracting medicine. Black bees may be shaken over an astonished crowd without a sting being inflicted, if the bees are thoroughly subdued with smoke, and the combs from which they are dislodged are old and securely attached to frames. Any person can perform this feat by observing the directions given for handling bees and in the foregoing remarks, without the use of "bee charms," or any other drug.

PROFITS OF BEE KEEPING.

Bee-culture differs entirely from the culture of any other stock, as they are self-supporting. They not only provide their own food, but with a little care, properly applied, will store a large surplus for their owner. They require no land, whercon to cultivate their food, no fences to prevent their breaking into fields and destroying crops, or to keep them from straying away. Horses, cattle and sheep have to be fed two or three times a day. Hard labor must be performed in obtaining and preparing their food ; numbers of broad acres of land are required for the cultivation of grain for their special food, yet no good farmer complains, although the profits derived therefrom are less than one-fourth of the profits obtained from properly conducted bee-culture, when compared with the amount of money invested.

Many persons have hesitated to engage in this pursuit from a fear of being stung ; yet a little practical knowledge of the nature of bees will enable any one to handle them without the least risk of being stung ; he will also ascertain that with properly constructed movable-comb hives, bee-keeping is made a successful business, dependent only on the observation of the natural laws which govern the honey-bee, and not on "luck" or "chance." By the use of such hives, the bee-keeper has perfect control of all the combs, bees and brood in

the hive ; by actual examination of its interior, he may, at any time, ascertain its exact condition, and apply the proper remedy for all defects. The introduction of improved hives, the high prices of honey at the present time, and a true knowledge of the manner in which bees are rendered peaceable and manageable, have induced many persons to engage in the business. "If those young men and women who now spend many hours in idleness or vain amusements, could be induced to purchase a swarm of bees, and give them the little attention needed, it would lead them to habits of industry and thoughtfulness, and fit them to be better citizens, besides wroving highly remunerative."—KING.

The few stocks which,—being entirely neglected,—do not prove profitable, should not be viewed as the general consequence of bee-culture, but that which can be, and is constantly done by proper management, should be regarded as its legitimate result. The following are a few of the thousands of examples of the profits arising from bee-culture properly conducted.

"On the 25th of April, 1858, I purchased ten hives of bees in the old-fashioned hive, for \$50. They were so full, that they had to be divided before I could move them. I divided the ten, and made twenty swarms. On the thirteenth day after, I divided them again. I took four queens from one hive in the cells, and ten from another, and gave each swarm a queen cell, which hatched the next day, making thirty swarms. I sold

from those thirty hives \$547 worth of honey, and the increase of my bees is worth to me \$500 more, making \$1,047 in one year, from an outlay of \$50. I took from one hive twelve frames filled with honey in fourteen days, and I had a number of hives from which I took twelve frames, filled with honey in twenty-one days."—*E. Townley, Cincinnati, O.*

Accounts of Bidwell Brothers, of Minnesota, for 1866, in the "American Agriculturist :"

"Our aim the past season was to get our bees into frame hives, and Italianized, and to secure the largest possible amount of surplus honey.

Bees have generally done poorly in our State this season, on account of wet weather; our statement for this year is as follows :

At the beginning of the season we had—

204 swarms of black bees, worth.....	\$2,020 00
One year's interest at 10 per cent. on the value of bees, hives and apparatus.....	322 00
	<hr/>
	\$2,342 00

At the close of the season the account stands—

15,347 lbs. of honey	\$3,899 11
252 " " wax, at 35c.....	88 20
256 swarms of Italian bees, worth.....	5,120 00
	<hr/>
Total.....	\$9,107 31
Deduct above amount.....	2,342 00
	<hr/>
Leaves profit.....	\$6,865 31

“The intelligent, practical bee-keeper can take care of five hundred swarms, and make a portion of the hives needed for new colonies.”—*U. S. Patent Office Report.*

Let us estimate the profits of bee-keeping, by commencing with only one stock, and on an average, doubling every year, we realize one hundred per cent. on the investment ; or count the lowest average amount of honey obtained from properly managed apiaries per year at the lowest market price, deduct the interest accruing on the capital invested, and you cannot be surprised that many of the most intelligent men of all nations engage in bee-keeping, since, at the lowest estimate, more profit is obtained than from any other occupation.

BEE KEEPING.

The question “Who should keep bees?” is frequently asked.

Rev. Robert Baird, D.D., says:—“There are few portions of our country which are not admirably adapted to the culture of the honey-bee. The wealth of the nation might be increased by millions of dollars, if every family favorably situated, would keep a few hives. No branch of industry can be named, in which there need be so little loss on the material employed, or which so completely derives its profits from the vast and exhaustless domains of nature.”

I think the occupation is adapted to all who desire a pleasant and profitable pursuit.

The Farmer should be a bee-keeper, as he has in his surroundings an inexhaustible bee-pasture, produced by his orchards, fields and timber, and as bees require no feeding, but board themselves, that stock is surely the most profitable.

The Horticulturist should keep bees, as he especially produces that which furnishes the busy bee with abundant material for work.

The Mechanic should keep bees; especially he who works in wood, as he can make his own hives and those needed by his neighbors; and each one will be richly rewarded for the little time required to care for them.

All Professional Men will find bee-keeping a pleasant and healthy recreation and pastime.

Disabled Soldiers and other Invalids should turn their attention to bee-keeping, it being a light and easy occupation, and more profitable than any performed by hard labor.

Old and young should keep bees, as honey and beeswax is required in every household.

Even those who own no land may keep bees, as they require but little room, and find their own food, for "roam where they will, the whole region is their common."

In short, *every person* can attend to a few stocks of bees during their leisure time, and those who wish to engage in a light and profitable occupation, can find it in this, the easiest and most profitable of all.

RECIPES.

1st. HOW TO SEPARATE CANDIED OR OTHER HONEY FROM THE COMB, BY HEAT.—After as much honey as possible is extracted from the comb, candied and liquid honey, yet adhering, may be removed by the following process: Put all the pieces of comb in a tin vessel and set it in a pot or kettle containing water, heat the water gradually over a fire, until it begins to boil, but no longer, as the impurities may impart a bitter taste to the honey; as soon as the water boils, take it from the fire and set it to cool, at least sixteen hours, so that the bee-bread or pollen may adhere to the bottom of the wax. After it is cooled, take off the layer of wax at the top carefully, the remainder is pure honey. As there is usually a large portion of honey adhering to the layer of wax, it should be boiled in water; and the sweet water used for making metheglin or vinegar.

2d. HOW TO KEEP HONEY A NUMBER OF YEARS.—After the honey has been separated from the comb, put it in clean jars, after two days skim off all impurities, seal up air tight, and keep in a cool *dark* place

3d. HOW TO MAKE HONEY TASTE LIKE SUGAR.—

Take honey drained from the comb, and gradually heat it over a fire, until it begins to boil, skim and take it from the fire, and put a wet towel or table-cloth over it, and let it remain about a quarter of an hour. This process should be repeated four or five times, and the honey then put up for keeping. This honey will be superior to fresh honey in a few years, its quality being greatly improved.

4th. HOW TO PRESERVE FRUIT WITH HONEY.—Put the fruit in jars, prepare the honey according to recipe No. 3, and while warm, pour it over the fruit so as to fill the jar ; put on the cap, and seal with wax and resin. In this manner, fruit can be kept a number of years ; and when the honey is poured from the fruit it will taste like and be of the consisteney of jelly, strengthening for the sick and a dessert for the healthy.

5th. HONEY-VINEGAR.—Take forty gallons of rain water, heat it and pour it in a barrel, add two quarts of whiskey, three pounds of honey, five cents worth of citric acid, and a little mother of vinegar ; fasten up the barrel, and put it in the cellar, and in a short time it will contain vinegar unsurpassed for purity and excellent taste.

6th. TO MAKE WAX FROM COMB.—Take all combs emptied of honey, and all wax obtained by separating honey from comb by heat ; put all of it in a pot or kettle, pour water over it, boil and stir for ten minutes ;

have ready a kettle with a little cold water in it, and a board perforated with a number of half inch holes, over it. Now take the wax from the fire, pour it in a bag, put it on the perforated board over the kettle, put another board over the bag, and weigh it down with a stone. In a short time the wax will be in the kettle below; and if there should be some wax left with the impurities in the bag, it may be boiled and pressed again.

7th. ELABORATION OF WAX.—Take the wax melted from the comb, scrape all impurities from the bottom side, put it in a clean kettle, pour clean water over it, boil and stir; if there should be any scum upon it skim it clean; after it has been boiled about twenty minutes, take it off, and let it get cold, take out the layer of wax, scrape the bottom of it and boil it again, and again, in clean water, until the desired purity is obtained; while boiling the last time, put in two ounces of starch for every pound of wax.

8th. TO MAKE METHUEGLIN.—Take two pounds of honey for every gallon of water; mix together and boil until the mass has attained such a consistency as to bear a hen's egg, with its end reaching out of the liquid. Then remove it from the fire, and when cooled off, put it into casks so as to fill them nearly full, cover the bung-hole with a cloth, bring the cask into a place having a temperature of sixty degrees Fahrenheit, and allow

it to ferment. After six weeks, filter it through a flannel cloth folded four times, and put it into small casks covered tightly with a bung, and again allow it to ferment; that which cannot be put in casks may be put in bottles and the mouth closed with a rag. The mass in the cask is gradually reduced by fermentation, so that the liquid in the bottles may now be added. In eight or nine months the metheglin is again poured into another cask, the bung driven in tightly, and the cask put in a cool cellar. Thus a healthy beverage is obtained which ought to take the place of the poisonous drinks which now flood the country, and ruin so many of our citizens.

9th. HONEY WINE.—Wine, made according to the following recipe, is a most delicious beverage, and after being bottled a few years, has been pronounced by competent judges to be equal to the best Madeira :

Mix ten gallons of clear water with twenty pounds of honey, put it in a clean kettle, boil gently and skim for thirty minutes. While stirring continually, add, gradually, two pounds of pulverized chalk, skim off all the substance which gathers at the top of the kettle, until no more appears on the surface, pour the mass into a vessel, let it cool and the chalk settle. Pour the liquid carefully from the chalk into a clean kettle, add four pounds of pulverized charcoal, and boil the whole gently for two hours. Remove it from the fire and let it cool, and then strain through a flannel cloth folded four

times. Pour the liquid once more into the kettle, and heat it to the boiling point. Take the whites of fifteen eggs and beat them to foam, add it to the boiling liquid, and boil gently one hour; remove it from the fire, and when nearly cooled off, put into casks, in which a small bag filled with one ounce of ground cinnamon, and one ounce of ground nutmeg has been put, let it ferment, and treat it as directed for fermenting metheglin. After it is clarified, fill it in bottles and seal them up. Lay them in a cool cellar, in wet sand, on which salt water is occasionally poured. Thus managed, it will keep for an age. This beverage—like the Spanish grape wine, but excelling it in quality—invigorates the stomach, promotes digestion, purifies the blood, and is very beneficial to persons recovering from sickness.

10th. BAGSTER'S PROCESS OF MELTING HONEY-COMBS.—“The combs are placed in a conical earthen vessel, filled with a mixture of one ounce of nitric acid to one quart of water. This is set over an open fire and stirred till the combs are completely melted, when it is removed from the fire, and allowed to cool gradually. The product is divided into three layers, the upper one pure wax, the lowest chiefly impurities, and the middle containing sufficient wax to be added to the next melting. A marketable wax is thus obtained at a single operation, without straining or pressing.”—*American Bee Journal*.

11th. CHEMICAL PROCESS OF BLEACHING BEES-WAX.

—“Add to one pound of melted wax, two ounces of pulverized nitrate of soda, and stir in by degrees a mixture of one ounce of sulphuric acid and nine ounces of water. When all the acid is added, it is allowed to become partly cooled, and the vessel is then filled up with boiling water and allowed to cool off slowly. The wax, when cold, is put into boiling water to remove the sulphate of soda and acid. It is then quite white, and should be perfectly freed from nitric acid, which tends to render it yellow.”—*American Bee Journal*.

CHAPTER IX.

BEE HIVES.

“The value of a hive depends upon its size, shape, and the advantages secured in its construction.”—KING.

PROPER SIZE.—A hive should hold about 2000 cubic inches, or nearly one bushel, dry measure, in the breeding apartment, with from 800 to 1000 cubic inches in the surplus honey receptacle. Upon the size of a hive, a large number of careful experiments have been made by the best bee-keepers of all nations, and nearly all seem to agree on the above dimensions; during these experiments, it has been ascertained that if larger, the swarms are less in number, and if smaller, the swarms will be smaller, and stocks will frequently fail to lay up enough provision for a long winter.

A hive of the above size will give, under proper management, a steady increase of bees with a fair amount of surplus honey.

For special purposes, such as the largest possible amount of honey with little or no increase, larger hives are needed.

SHAPE.—On the shape of a hive many advantages depend: if too tall and slender, the cold in winter will affect the interior almost to its centre, and less box honey is obtained. But if too shallow, a large bottom surface is presented, making it necessary for the bees to spread in covering the lower part of the comb to protect them from the moth, thereby losing a large amount of heat for breeding. Their winter stores are also distributed over so large a surface and of so little depth, that although the heat arising from them as they cluster below it, will keep the honey warm directly above them, they soon consume that to the top of the hive; and frequently, bees are found dead with plenty of honey *around* them. Even if the entire cluster of bees could be induced to vary from their course, pointed out by nature, and move altogether to either side in order to obtain the honey, it would be too cold to serve as their winter food. In warm days during winter, the cluster sometimes disperses in search of food; yet, this is only the case when there are holes through the combs, as it is certain death for them to venture around the edge of the frosty combs by which they are surrounded. Common box hives should be equal in length and width, and one-fourth higher than their width.

In a hive thus proportioned and of the proper size, the bees are sufficiently protected from cold winds, the bottom surface is small enough to permit the colony to cover all the lower part of the combs and retain enough heat for breeding purposes, thus having several manifest advantages over shallow hives. At the approach of the honey-gathering season, such a hive has a less number of young bees than the tall hive.

The frames of movable-comb hives should measure more in depth than in width, and the width should be nearly equal to the distance from one side of the hive to the other, across the frames. If constructed according to the proportions given for the common box hive, the same advantages in breeding and wintering are obtained.

ADVANTAGES SECURED IN THE CONSTRUCTION OF HIVES.

In the construction of hives, not only a cavity as a home for bees may be made, but many advantages both for bee and bee-keeper, may be secured. To construct a hive, giving *complete control of the bees and combs*, thereby making bee-keeping a pleasant, sure and profitable business, has been the aim of many intelligent men, for centuries. Yet, a thorough knowledge of the interior of the hive and the control of combs was not obtained until Francis Huber, of Genoa, in 1793, con-

structed his sectional, swinging comb, or "Leaf Hive," the combs of which could be swung apart like the leaves of a book.

It was known long ago, that bees would build on bars or sticks across their hives, and Dzierzon, of Carlmarkt, in Germany, availed himself of that fact in constructing his bar-hives; in it. the bees built their combs on movable-bars, attaching their edges to the hive; these attachments had to be separated before the combs could be removed. To prevent this side attachment, Taylor, of England. describes the following in "Taylor's Bee-Keeper's Manual":—"For the purpose of preventing the bees from attaching the combs to the glass, thin *upright strips* of wood, rather more than half an inch thick, are tacked under each bar at both ends, extending from the top to the bottom, inside the hive."

These upright strips were close-fitting to the hive. M. Debeauvay, of France in his "Guide del Apiculture," (second edit on published in 1847, third edition in 1851,) describes his movable-frames, the tops of which were narrow and close-fitting to the honey-board above them, their *sides and bottom being at suitable distances from each other and from the case*. About the year 1852, the movable-comb frames became known and patented in the United States. Many improvements have been made, and movable-comb hives are

now to be found in almost all apiaries where bee-keeping is carried on in a pleasant, perfect and profitable manner.

THE CHAMPION BEE-HIVES.

Centuries ago, bee-keeping was conducted to a large extent, yet with less success than at the present time. Since the introduction of the movable-comb system and many other improvements in bee-hives and bee-management, old systems are dispensed with, and the attractive pursuit of the culture of the honey bee has been rendered pleasant, safe and profitable. Many hives now in use, are not in harmony with the nature of the bee; the size, shape, and so-called advantages, are frequently in opposition to the safest and most profitable manner of management, especially when we consider the difficulties in removing the comb frames, the liabilities of crushing the queen and other bees, and of injuring the combs.

In the CHAMPION HIVES each comb is securely built within a frame or sash, and is so arranged that it may be seized from the outside and removed, each one by itself, or all of them together, or any number of them, from any part of the hive, without any cutting or breaking of comb. The liability to crush bees, kill the queen or injure comb whilst removing it, so general in other hives, is entirely overcome in this hive. The frames are so arranged with a comb-guide, which not only insures uniform, straight comb, but also causes the bees to commence and continue the building of WORKER COMB, and are kept at proper distance from each other and from the wall of the hive, by projecting nails and edged cleats; and the hive opens from the side and top, so that the comb can be moved apart before lifting them out of the hive, and this, WITHOUT DIMINISHING the space between any of the combs. By thus easily removing any comb, honey may be taken, combs and brood to strengthen a weak colony, or to furnish a queenless swarm with the means to raise another queen, or the whole colony may be divided, making two from one in less than five minutes time.

By the use of a SIDE-OPENING hive, we not only obtain the greatest facilities for the easy removal of combs, but we are also enabled to use a frame of sufficient depth for successful out-door

wintering and early breeding, thereby beginning the season with a strong number of young bees, and thereby secure an extra amount of surplus honey as the result.

The frame tops are close fitting to each other throughout their entire length, with large openings through the middle EXTENDING from END to END, with a free passage over the top of the comb and below the frame-top; thus we furnish a partition or honey-board with large and thorough upward communication, upon which to place surplus honey receptacles: if boxes are used they are placed on the frame-tops, the bees having no great distance to travel or air space to cross to reach the boxes, do readily ascend into them from any frame in the hive. To obviate the difficulty of getting bees to work in an empty box after a full one has been removed, this hive contains a double tier of neat glass-sided boxes; the bees are first allowed to work in the lower boxes, and when nearly full, the empty boxes are placed UNDER them, and the bees in their eagerness to fill the gap, commence at once in the empty or lower box, and in finishing the upper box, pass through openings in the top of the lower boxes.

Frames may be used in the upper part of the hive instead of the boxes; from these the honey can be removed with the HONEY EXTRACTOR, and the combs returned to the bees to be filled again, when the operation may be repeated, or it may be sold in the frame.

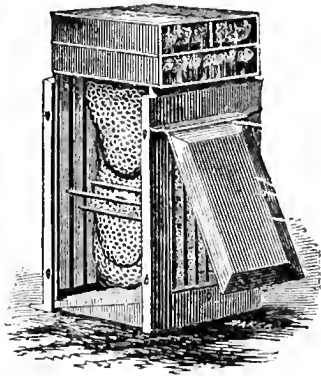
MOTH TRAP.—By the proper use of our improved frames the practical bee keeper will find no trouble from the moth worms, by keeping his stock strong; but to those who desire it we furnish hives with our moth trap. By the use of this trap we obtain the brood of the moth before they enter the hive, which makes it the most complete trap ever made.

ENTRANCE REGULATOR.—The entrance of the hive is regulated with a simple slide, so arranged that the entrance can be contracted to the admission of a single bee, thus effectually guarding a weak colony from robbery, and to keep out mice and other vermin. The heat of the hive is also retained in the hive in winter and early spring; or the entrance may be entirely closed. By inverting the regulator an entrance is given only large enough to allow free passage to a loaded worker bee, confining a fertile queen to her hive. Thus arranged, bees may be left at any time during the swarming season without the least risk of

their swarming during the absence of the bee-keeper; or the drones, while out and at full flight, may be excluded from the hive with the same device and destroyed.

COMBINED FEEDER AND VENTILATOR.—The hive is thoroughly ventilated through openings near the top of the breeding apartment, and by the use of our **COMBINED FEEDER AND VENTILATOR**. With this device, ventilation is obtained from the **CENTRE** of the hive, and so arranged that no cold currents can pass; it admits air without light and is never glued by the bees. Ventilation can be regulated or entirely stopped by a simple turn. With the same device, bees can be fed from the outside in the top of the hive away from robber bees and without disturbing the bees in the least; it works equally well when used to furnish bees with water, honey, syrup or meal. It can be used on every style of hive ever made. The importance of feeding is only fully realized when we bear in mind that from a pound of sugar syrup, costing only six cents, as much comb will be built as from a pound of honey costing thirty cents; and that by feeding a few pounds of syrup in early spring and during a scarcity of forage, breeding is stimulated to such an extent as to **DOUBLE** the profit. This feeder is made entirely of metal, is warranted to be the most efficient feeder made, and **CHEAPER** than any other. Try one.

TWO HIVES IN ONE—The hives are arranged in such a manner that each may be enlarged or diminished without alteration of existing parts, or may be used as two **SEPARATE** hives, temporarily, in case a swarm should issue when no other hive is en hand.

HIVE No. 1.

This cut shows hive No. 1, side removed, with glass in rear, glass cover partly open. Double tiers of large size boxes, and frames partly filled with comb, showing also that style of our frames as are made with central bar.



This cut represents hive No. 1. The door A in the hive; tho

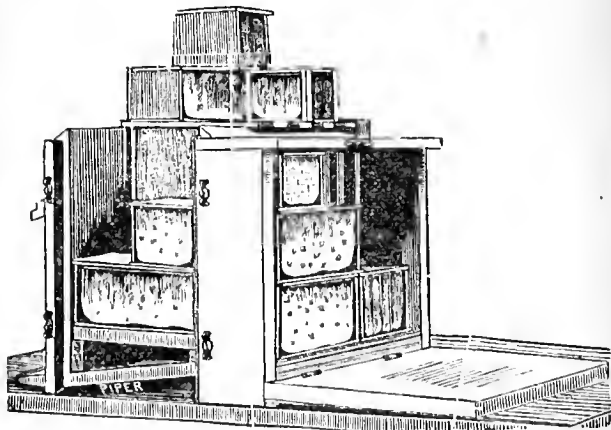
second story removed and set on the left of the hive; the roof is placed on the lower part of the hive, and the "Combined Feeder and Ventilator" *D*, placed thereon, arranged as a feeder; the entrance regulator *E* is adjusted to guard against robbing. The second story *B*, is set on one end, giving a bottom view of two boxes, each filled with three combs, and a view of four filled frames, the spaco board near the right side; an extra box of large size *C*, is set on the top showing combs through the glass side.

This hive contains all of the above features, is the usual size, (2,000 cubic inches in the breeding apartment) designed to give a steady increase of bees, with a fair amount of surplus honey. It is cheaper than any other first class, practical hive, (see price list,) contains more advantages, is readily understood and easily handled, and is, hence,

The Champion Hive

of the general bee-keeper, and it gives satisfaction to all who use it.

HIVE No. 2.



This hive is designed as a omnivernh-egi ano,s r for a mod-

erate increase of bees with the largest possible amount of surplus honey. The size of the frames and boxes is the same as for hive No. 1 so that the frames or boxes can be used in either hive. The size of the hive is nearly double that of hive No. 1, has all the features heretofore described, and is, in addition, arranged with box room in the entire rear of the hive, into which the bees can enter direct from any frame in the hive. It is also arranged to hold four more frames than No. 1, and a movable close-fitting division board, so that a swarm may be confined to an appropriate amount of space, and as the stock increases more room can be given by moving the division board. Or the hive can be arranged to hold two separate swarms; also to hold an extra large colony, giving all the frames, and extract the honey with the "Extractor," from either the upper or lower frames. If box honey only is desired, boxes can be arranged on the side, as shown in the cut, in addition to the rear and top boxes.

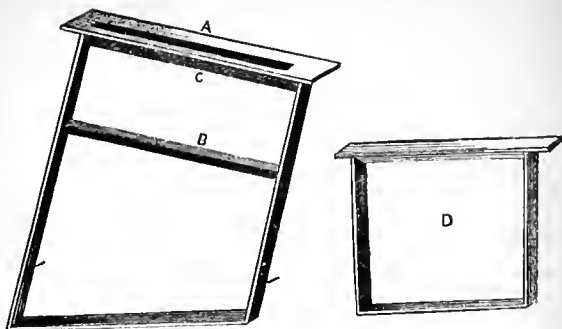
The above cut shows as having three boxes removed from the side, three boxes from the rear, and eight boxes from the top.

HIVE No. 3.

This is composed of two equal stories, each holding twelve frames and a close fitting space board. The hive differs from the other styles of the Champion hives, in not being side opening, having frames of two inches less height, and a side space board. By first removing this space board, room is made on one side of the frames so as to admit of moving them apart before lifting them out at the top. Each story may be used as a separate hive, or as breeding or surplus honey apartment; is especially designed to be used in connection with the Honey Extractor, but either part may be furnished with boxes at the option of the bee-keeper.

HIVE No. 4—DOUBLE-SIDED.

To meet the wants of those bee-keepers who are so located as to expose their bees to the direct rays of the scorching summer sun, or the freezing northwest wind of our northern climate, we construct a double-sided hive, by making the end pieces of frames as well as the tops, wide enough to fit to each other through their entire length. A thin board is inserted on each side, between the frames and the case, and the hive is thus made double-sided, with air space around the entire colony. Thus constructed, neither the sun nor the cold wind of a severe winter will affect the interior of the hive.



This cut represents the frames in the Champion hive. *C* shows the comb guide communicating upward on each side by means of the opening *through* the frame top, seen below *A*; *B* shows a central bar, which is furnished to those who desire them. The engraving, however, fails to show the curved notch in the centre of said bar, which invariably secures an opening through the comb. *D* shows the upper or surplus honey frame with comb-guide on the top.

BEE TRAP.

The patents of the Champion hive embrace the right to use a bee-trap, a device attachable to any hive, being so arranged that all bees can pass through it easily, yet prevents their return. With it a swarm of bees can be collected in their hive in a short time, in case they are to be sold in the middle of the day, when most of the bees are abroad; or robber and wild bees entrapped and domesticated without the trouble of hunting the tree; by reversing the trap, all bees can pass out, and

by excluding the drones with the sectional slide, all drones of a hive can be destroyed in a single day.

BEE-HIVE PATENTS.

As there are many persons engaged in the sale of hives, who have only a patent on a slight change of a part, while the main portion is a gross infringement on other patents, we deem it due to the public and ourselves to give the following explanation :

PATENTS ON THE CHAMPION BEE-HIVE.—CLAIMS.—
No. 59,614, dated November 13, 1866. I claim :—

1st. The reversible entrance protector “*C*” provided with swinging bars *V* supports *Y Y* and front *G* ; all arranged and operating substantially as and for the purpose set forth.

2d. Constructing and arranging the moth-chamber ; substantially in the manner and for the purpose set forth.

3d. Constructing and operating the sectional, adjustable, sliding, swarming-guard and entrance regulator ; substantially in the manner and for the purpose as above set forth.

No. 67,123, dated July 23, 1867. I claim :—

1st. The comb-frames *R*, with the bars *i'*, and bars *oo, i°* ; constructed and arranged substantially as and for the purpose described.

2d. The elevated bottom, in combination with the moth-groove *A*; constructed and arranged in the manner described, for the purpose of aiding the litter of the hive to slide into the groove.

3d. The movable-side *n*, provided with projecting cross-cleats, in combination with the comb-frames *R*; constructed substantially in the manner and for the purpose set forth.

The above claims thoroughly cover all patentable features of the single and double-sided Champion beehive.

Rev. L. L. Langstrath, in his re-issued and extended patent, claims all movable-comb frames having "their tops separated from each other, throughout the whole or portions of their length." In answer to a special letter directed to him concerning our frames, he says:—"If the tops touch each other throughout *their entire length* the frame is not covered by our patent."

To more clearly understand the words of the claim on our frame "as described," we will insert an abstract from the specification:—"The top bars *K* are made wide enough to have the edges of the several frames to touch each other;" and "the bars *oo* will touch the same bars of the next adjoining frame, forming a partition between surplus honey and brood-comb, with no other passage than the central \times -shaped bee-passage. From the above it will be seen that we hold the right

to all frames having their tops touching each other throughout their entire length, with openings through the centre of them, whilst Langstrath holds the right to all frames having separated tops.

MAKING HIVES.

The Champion hive is probably the cheapest movable-comb hive before the public, especially if made without the large observing-glass in the rear, as almost all movable-comb hives are. The hive being without tubes, hooks, hinges, knobs or metal slides, and simple in construction ; in shape nearly like the common box-hive, requiring only about twenty feet of lumber, of usual width, for its construction ; requiring no morticing or matching, each part being easily cut with a saw ready to nail together, enables a good mechanic to make two or three of this style, by hand, per day. The hives have a good appearance and may be made very ornamental, by inserting the 10 x 12 observing glass in the rear, making the honey-boxes with glass sides and painting the hives so as to resemble clouds or marble. The advantages of the glass-sided honey-boxes are so great that we make no other style, the extra work being but trifling, especially where machinery as used in our factories, is employed.

PAINTING AND CLOUDING HIVES.

The smell of fresh, *white lead* paint is very offensive

to bees, and hives should be painted a month or more before using them ; the *color* affects the hive but little, and it may be painted any shade of color to suit the fancy of the owner. We think elouded hives have a better appearance when the various curls are sufficiently defined. To eloud a hive, paint thoroughly with any substantial white paint, and as soon as the last coat is applied, place the hive in a horizontal position, and pass the smoke and blaze of a common lamp without flue, or that of a candle made of resin and beeswax under it. If done in a room out of the wind, it may be made to resemble marble, and requires only a few minutes time.

MARKING HIVES.

The law requires that all patented articles must be marked as such ; and as hives are improved in appearance by tastefully lettering them, we furnish lettered paper cards, which, if kept dry, and are carefully used, will last for years, also metal stencil cuts at cost. Lay the hive down, front side up, lay upon it the lettered card, and with a common brush apply a *very little thick* black or red paint ; ready mixed paint may be darkened with lamp-black or red-lead.

MANUFACTURING ESTABLISHMENTS.

We still desire to correspond with factory men and owners of steam planing mills, where lumber is plenty

and cheap, for the manufacture and sale of hives on liberal terms. We already have several in successful operation, yet we desire a factory in every three or four counties, throughout the land, so that all orders sent us can be filled from factories so near the purchaser, that they may come and receive them, or make the expense of shipping but trifling, and thus greatly aid in the general introduction of our improvements in the most distant localities. We pay a price equal to hand labor, for the purpose of increasing the number of factories; yet more than half the work can be done with machinery. The lumber may be dressed with a planer and cut up with a small circular saw. No morticing or matching is required to make our ornamental hives, and a good hand will cut up lumber for one hundred and more per week, or nail together one-third that number ready for painting. Any seasoned lumber will do for hives, and boards of almost any width will cut up for the small parts of the hive.

The attractive appearance of this hive, and the simplicity of its construction, combined with the many advantages over others, has caused a general demand for them, and the perfect and permanent satisfaction given wherever used, has made them the *standard hives* of many of our best apiaries. They are universally used in Germany, and to a large extent in other countries.

INTRODUCING IMPROVED HIVES.

INSTRUCTIONS TO OWNERS OF TERRITORY AND AGENTS.—We receive many letters, the writers of which desire information as to the best manner of commencing bee-keeping as a business, and of introducing improvements in bee-culture. To avoid the tedious job of answering by letter, we insert the following article for the benefit of all such correspondents, which, if carefully followed, will enable any one to engage in the culture of the honey-bee and other branches of business connected therewith, with a small capital, and a certain and speedy return of profit.

Arrange an apiary tastefully and commence bee-keeping in proper hives. Construct an observing hive, with glass sides, measuring two inches between,—holding but one comb, and darkened with shutters. In this hive, the queens may be seen depositing eggs, and many of the “wonders of the bee-hive” will be revealed; such a hive and the Italian bees will attract a great number of visitors, who will become interested and purchase books, rights, hives, and order Italian queens. By Italianizing your bees and all in your neighborhood, you will be prepared to rear queens and Italian stocks for the entire region, which, aside from the profits of an apiary will give a large profit, and may be carried on in connection with selling books, rights and hives. An inexperienced person should freely send or distri-

bute circulars to all the bee-keepers. He should hang up our ornamental circular in post offices, or stores, with his address on each, that the bee-keepers may know where to apply for books, rights, hives and Italian queens. County fairs, elections, public sales and other gatherings should be attended, as they afford rare opportunities to sell books, hives, farm and township rights, and to take orders for Italian queens. Our circulars always create a desire to see the hive, and a sample hive should be kept for exhibition. In this manner many sales can be made with little effort or loss of time, and scarcely an interference with any other business. We also employ agents to sell township rights.

If the party has qualified himself in the knowledge of practical bee-culture, and is duly prepared by purchasing an outfit, he will easily convince men :—

- 1st. That bee-keeping is profitable.
- 2d. That this hive is the proper one for profitable bee-culture, and worthy of adoption.
- 3d. That selling books, rights, hives, Italian queens, and purchasing and transferring bees will pay, and that any one of these five branches of business, is a good business alone, and yet, so connected that each will aid the other.

The agent will thus find plenty of purchasers, as several persons will frequently club together and purchase their township, the cost being no more to each

person than that of a single farm right. Traveling agents and owners of large territory, frequently divide a township into shares, induce some influential person to accompany them to parties most likely to purchase, by giving him a share free. If the shares cost only as much as a farm right, the advantage of obtaining an interest in the entire township induces many to purchase; and, frequently, several townships are thus sold in a day or two. After an apiary has been established and the surrounding territory is secured more money can be made by retaining it and selling farm rights, than by selling out entirely; the price obtained for a few farm rights being frequently equal to that received for an entire township; and many more rights may be sold annually for a number of years, especially in newly settled localities.

Good wages can be made by manufacturing a large supply of hives. Where lumber is cheap, they can be made for nearly two-thirds the price at which they are counted in making sales of farm rights and hives together. More rights can also be sold when a hive can be furnished. A great number of hives can be speedily distributed, by leaving a hive with each bee keeper before swarming time; many sales may be made at the time; and with many others, agreement can be made to the effect that he is to hive one of his *first* swarms into your hive, for a certain price, which you will pay him, should he not be inclined to pay for farm right

and hive. After swarming time, an empty hive will seldom be found. As soon as the bees are thoroughly at work in the hive, so that the manner in which the combs are built and moved, may be seen, the holders will seldom part with the hive ; and if any one has obtained bees in this way to stock his apiary, we have not yet heard of him.

The sale of farm rights and hives may be continued until late in the season, by transferring the bees and combs from the common hives, putting plenty of honey into the frames. Some bee-keepers may be reluctant to purchase after swarming time. Should he express fear of losing his bees from such operations, purchase one of his stocks at a reasonable price, informing him that he may retain them by paying your regular price. In such case select the strongest stock, with broad straight combs, and transfer it to the movable-comb hive. Never transfer a weak, or hive a small swarm. If early in the season, you will often leave out honey enough, and comb for wax—which is unfit to transfer—to pay for the stock, besides leaving plenty for the bees and brood. If the bees are properly subdued, (see “ Handling Bees, ”) many spectators will be attracted, who, seeing the bees so easily handled, become interested ; many will purchase books, farm rights, and hives ; and the owner, seeing the performance, becomes convinced, and will usually pay you at once. If not, in due time the honey boxes will be filled with choice honey, and

self-interest will cause the veriest old foggy to yield his prejudices.

A large number of orders for Italian queens may be obtained at the same time, frequently by merely showing the beautiful color of a few workers, carried in a vial with any clear liquid. When going to the county or State fairs, or other public gatherings, take two hives, keeping the cap on one, to show the general appearance, and use the other for exhibiting the interior. One or two frames should be filled with comb, sufficiently tough to bear handling, in order to show more readily the manner of comb-building.

By taking an Italian queen in an observing hive, containing a frame with honey and enough workers to keep her warm, choosing a position where many persons have to pass, and calling their attention to the Italian queen, a large number of books may be sold and orders for Italian queens obtained. The small price and adaptation of the book to common hives, will induce nearly all who have bees, to purchase a copy, especially if sold for five or ten cents less than the retail price, while on the fair ground.

This book will teach them how to make bee-keeping profitable, and they will afterwards want better hives. Thus you will prepare the way for a still greater sale of books, rights, and hives.

Good profits may be made by purchasing books by

the quantity, at our wholesale price, and selling them at book-stores by the dozen, or by leaving them on commission in stores and post-offices, hanging up our ornamental circular to attract attention to them.

PRICE OF TOWNSHIP AND COUNTY RIGHTS.

Should we make many sales of whole States, our extensive advertising, both in the English and German language, would be diminished to some extent, and we prefer to sell township rights, rather than large tracts of territory, where the hive is being introduced, as the superiority of and permanent satisfaction given by the Champion hive, constantly increases the value of territory.

Our price for the right of a township containing—

Less than 100 voters, is	\$25 00
If between 100 and 150 voters	30 00
Between 150 and 200 voters.....	35 00
Between 200 and 300 voters.....	40 00
If over 300 and not over 500 voters.....	45 00
If over 500 voters	50 00

If the number of voters in your township is not known, see the last census report, or ask any justice, trustee or politician, and ascertain the price from the above township price list.

Our price for a county right is the same as for the three best townships in the county, as above set forth; payable, one-half cash down, the other half in good

notes, payable, with interest, in one year, and secured by mortgage-deed on the county right sold. By purchasing a right for an entire county, on the terms named, good profits can be made by establishing a hive factory, having full power to manufacture and sell without restriction in the county. By selling one of the most distant townships at your own price, or by the sale of a few farm rights, frequently made in one or two days, enough money is realized to pay for the entire county.

LIBERAL OFFERS.

The hearty commendation elicited from all persons using the Champion hive, and the many medals diplomas, premiums, etc., awarded it wherever exhibited, encourages us to believe that in many places where the hive is known only by reputation, if its merits were thoroughly tested by the establishment of agencies, introduction of Italian queens and selling of township rights, the value of the surrounding territory would be greatly increased and the introduction of the Champion hive greatly facilitated.

We therefore make the following offer :

To the first person applying from a township where the hive has not been introduced and is not kept for sale, we will send a deed of the township right for *one-half* the regular price, as set forth on our township price list, and will add the following *Premiums* :—Sam-

ples of the Bee-Keeper's Guide; printed bill of measure and directions for making hives; blank deeds of farm or individual rights prepared expressly for owners of territory; pamphlets; certificates of agency for adjoining townships; and an Italian queen at one-half of the regular price. Or, the

AGENT'S OUTFIT, viz.:—Certificate of agency; one first-class sample hive; deed of farm right; sample of the "Bee-Keeper's Guide"; one dozen pamphlets for bee-keepers; bill of measure and directions for making hives; and lettered card for marking hives, for \$15. Also an Italian queen at one-half our regular price, and the \$25 *premium* named in the "Terms to Agents."

\$25 ADDITIONAL PREMIUM, in farm rights, will be given to the first person applying for an agency in unoccupied territory, and sending us ten dollars for the regular *agent's outfit*, as offered above.

The above \$25 premium and a sample hive will be given to the purchaser of, or the getter up of a club to purchase, a township right, at the *one-half* price offer stated above, including the out-fit of blank deeds, &c., for the township, as well as a certificate of agency, as authority to sell the farm rights received as premiums, in adjoining or other townships.

By the aid of books, four or five persons can easily be induced to join such a club, each paying a small sum, or, at most, no more than five dollars; less than the cost of a farm right.

PRICE LIST.

The American Bee-Keeper's Guide, bound in muslin, sent by mail post-paid, each	\$ 1 00
ditto, two copies	1 50
ditto, one dozen, per express	6 00
ditto, in paper cover, by mail, each	50
ditto, " " three copies	1 00
ditto, " " by mail, per dozen	3 00
ditto, " " per exp. "	2 75
ditto, " " " per 100	20 00
Deed of individual, or farm right, to make, get made, or purchase and use any number of all the different styles of the Champion Hives and "Combined Feeder and Ventilator"	10 00
Individual right to get made and use the "Combined Feeder and Ventilator" on other hives	3 00
Pamphlets for agents and owners of territory, with place for address, per doz., 25 cts.; per 100	1 00
Illustrated bill of measure for hive No. 1, per doz.	30
Blank deeds for owners of territory, per doz	50
Brass lettering card, to mark hives, with the date of our patents and the agent's address, at cost	3 00
Prepared card board, lettered to cut out with a pen knife, by mail, pre-paid	25
*Bee smoking pipe, each 30 cts; by mail, post-paid	40
Bee veils, each, 60 cts.; two	1 00
*The Champion Wax Extractor	3 00
*Combined Honey Knife, Frame lifter and Scraper, per exp.	1 50
*Kretschmer's Honey Extractor, and two knives	14 00
Combined Feeder and Ventilators, one per express	30
" " " " by mail, post paid ..	50
" " " " per doz., per express	3 00
" " " " 50 or more " each ..	20

* For description of these articles, send for our illustrated pamphlet, free to all.

PRICE LIST OF HIVES.

—O—

To Agents, Owners of Territory, and all who have a Right to use.

—O—

1 No. 1 hive with feeder and ventilator.....	\$4 00	10 to 25 No. 1 hives, without feeder and ventilator, each..	\$3 00
2 to 5 No. 1 hives, without feeder and ventilator, each..	3 50	25 to 50 ditto, " "	2 80
5 to 10 ditto, " "	3 25	Over 50 ditto, " "	2 70

The above prices are for hives without moth trap. Where trap is desired, add 10 cents per hive to the above price.

No. 2 HIVES.

One hive,	\$6 00	25 to 50 hives, each....	\$4 25
2 to 10 hives, each.....	5 00	Over 50 " "	4 00
10 to 25 " "	4 50		

No. 3 HIVES.

One hive, with stand.....	\$4 50	25 to 50 hives, with stand each	\$4 00
2 to 10 hives " " each.....	4 25	Over 50 " " " " " "	3 90
10 to 25 " " " "	4 10		

All our hives are thoroughly made, dressed on both sides and thoroughly painted.

MATERIAL FOR No. 1 HIVES.

Cut ready for nailing with all trimmings, except nails, paint and glass, in lots of five or more, packed and shipped as common freight or express.

5 to 10 hives,	each, \$2 25
10 to 25 " "	" 2 00
Over 25 " "	" 1 80

To any person, residing where our hives are not yet in use or kept for sale, we will send one hive of each or either style with right to use it, only at the above price.

ITALIAN BEES.

BREEDING STOCKS.

I make annual importations of choice queens, directly from Italy; and aside from my own importations, I have stocks from the importations of Langstroth, Grimm and Quinby. In order to prevent "in and in breeding," my customers can be furnished with queens of different importations and crosses; and for that purpose retain a record of parentage of each lot of queens furnished. I have now been engaged in the cultivation of these bees over 17 years—in Germany and America—and my experience enables me to furnish choice queens, at prices, by far less than is charged by other breeders for similar queens.

PRICE LIST.

All queens will be sent by mail, unless otherwise requested; purity and safe arrival guaranteed.

One queen.....	\$ 5 00
Three queens.....	10 00
Twelve queens.....	35 00
A full colony in No. 1 Champion hive.....	18 00
An artificial swarm in No. 1 Champion hive, containing young queen, and breeding part half full of comb and bees.....	15 00
A natural swarm in No. 1 Champion hive.....	12 00
A natural swarm in a common shipping box.....	9 00

In ordering bees, give your Name, Post-office and State *plainly*. All orders will be registered in the order in which they arrive; and where accompanied with the cash, will be filled in the same manner.

Address,

E. KRETCHMER & CO.,

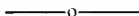
CORBURGH, Montgomery Co.,

IOWA.

AWARDS

OBTAINED BY

THE CHAMPION BEE-HIVE.



The Champion Bee-Hive with the improved movable-comb frames, has received the HIGHEST AWARD at every State and County Fair, wherever yet exhibited. Also the "CHAMPION DIPLOMA" of the German Bee-Keeper's Association in 1866-67.

REPORT OF THE COMMITTEE OF THE GERMAN APIARIAN CONVENTION HELD
AT Breslau, 1866.

Although a large number of hives are represented, many of them ingeniously constructed, justice demands from us to award the highest prize, the "Champion Diploma," to E. Kretschmer's Champion movable comb hive; its cheap and simple construction, its ornamental appearance, the convenience it affords the bee keeper to manage it and the bees, the secure protection it affords to the bees against the heat, cold, the formidable moths, and against robber bees, is not equalled by either German or American hives here represented. The construction of every part of the hive is founded on a thorough knowledge of the nature and laws which govern the bee. In this hive every comb can be taken out without injuring them in the least, or crushing or killing the bees; to secure natural heat from the bees it is upright in form, with proper ventilation at the right place where the bees will not glue it over, and the simple arrangement for securing and removing the brood of the moths, together with the low price at which the hive can be made, makes it the champion of all first-class hives now before the public.

JULIUS J. ZAUHM, Chairman of Committee.



GRAND SILVER MEDAL AT THE LATE PARIS EXPOSITION.

Breslau, October 1, 1867.

E. KRETCHMER—*Dear Sir:* It may be surprising to you to learn that your "Champion Bee-Hive" has taken the highest award, "A GRAND SILVER MEDAL," at the late Paris Exposition. The hive was exhibited in the Prussian Department by ERNST OBST, the President of the National Bee-Keeper's Association. I have since received orders for 3 619 hives. Enclosed find the letter of E. Obst, sent to me.

Yours, &c.

B. GRAMSCH.

LETTER OF ERNST OBST.

POTSDAM, September 20, 1867.

HERRN. B. GRAMSCH—*Sir*: For the purpose of comparing, and to ascertain whether our views of hives were verified by bee-keepers of other nations, I took with me to the World's fair, held in Paris, one of E. KRECHMER's "CHAMPION BEE-HIVES," containing his improved comb-frames, as manufactured by you. The Apiary Department was well represented. Implements for bee-keepers' use; specimens of honey; several stocks of Italian bees; and 187 hives of various kinds were in competition. Nine judges were appointed to examine the various hives and other articles resulting in the award of a GRAND SILVER MEDAL to the Champion hive, AS THE BEST APIARY HIVE. Upon my return, I placed the same hive, with medal attached, on exhibition at our annual meeting a few days since, where it not only received the "Champion Diploma," but was also declared by unanimous vote to be the STANDARD BEE-HIVE. Please inform our American friend of the success his hive has met with.—

* * * *

Yours, &c.,

ERNST OBST.

EXTRACTS FROM THE REPORT OF THE SOUTH-WESTERN IOWA APIARIAN ASSOCIATION.

MR. WILSON: * * * The single-sided style of the CHAMPION HIVES HAVE MANY DECIDED ADVANTAGES over the American and Langstroth bee-hives. I shall hereafter use them only. * * I have given them all a thorough trial, and from experiments made, can say that I must exclude the Langstroth hive; and of the Champion or American, THE CHAMPION IS CERTAINLY THE PREFERABLE HIVE."

"All members agreed that tall hives are better than shallow ones."

"* * * For moving combs, none can be equal to the Champion bee-hive, it being opened from the side as well as the top, which enables the operator to move the frames from each other—although the same may be done with the American, the Champion has some advantages over it, even for removing combs. The tops of the frames of the Champion are so constructed that they can be seized from the outside of the hive, and are never fastened by the bees."

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NOTICES OF THE BOOK AND HIVE.

PRACTICAL HINTS ON BEE-KEEPING.—We commence to-day the publication of a series of articles, which we shall publish from time to time, on the management of bees, written by E. Kretschmer. The articles will be both scientific and practical, THE BEST EVER WRITTEN ON THE SUBJECT. Every farmer should not only read them but study them. They are worth to every farmer more than the annual subscription price of the Gazette and Argus.—[Burlington (Iowa) Gazette and Argus.]

We take pleasure in announcing that after a thorough trial of the Champion bee-hive, we find in it just what has long been wanting, A HIVE COMPLETE IN EVERY PART, and this in a cheaper and more simple form than any other we have yet seen.—[South-Western Review.]

Mr. E. Kretchmer is known not only as a practical bee-keeper, but as a first-class writer on the subject; and every owner of a swarm of bees should possess one of his books.—[Central Journal.

We are informed that Mr. E. Kretchmer, the able writer on the culture of the honey-bee, will soon publish a standard work on the management of bees. Our readers can expect a work containing practical information of unequalled value to every bee-keeper.—[Klinger's Bote.

* * Of hives we have tried every popular hive before the public, but the Champion hive is yet our favorite.—[Deutsche Freiheit.

The Champion bee-hive, the cheapest and most perfect hive before the public.

The "Bee-Keeper's Guide" contains much practical information, and should be read by every family.—[Page County Herald.

A NEW BEE-HIVE.—"A great success in its line."—[Burlington (Iowa) Hawk Eye.

Giles B. Avery, Albany, N. Y., says of the Bee Keeper's Guide: "As far as the work treats of the science and philosophy of Apianian management, we consider it 'sands of gold' and 'multum in parvo.' A copy should be possessed by every Apianian in our land. It embodies in small space, the gist of information liberally set forth by Wildman, the German Apianians, Langstroth, Quinby, Harbison, Kidder, King, and others."

Dr. Jewell Davis, of Charleston, Ill., says of the book: "I have carefully examined it, and find it very comprehensive and to the point; embracing the full science of bee culture in little space; the most complete work for the general bee-keeper."

COMMENDATIONS OF THE HIVE AND FEEDER.

The Champion, a simple hive. * * * Now to be valuable, a hive must be simple, easily opened, and have its surplus honey in new and marketable comb.—Mrs. Tupper, on hives, in "Burlington Hawk-Eye."

W. BEDWELT, OF ST. LOUIS, MO., IN A LETTER TO A. AIKENS.

As we make bee-keeping our business, we have tried every hive, submitting the Champion hive especially to the severest test, and now can say that it is the most PERFECT HIVE for keeping bees as a business; in it we obtain early box honey, perfectly free from bee-bread. Be not deceived by hives resembling it in appearance, but purchase the genuine "Champion," and the "Bee-keeper's Guide-Book;" read it, follow its directions, and success in bee-keeping will be certain.

O. S. MILLER, OF BURLINGTON, IOWA, TO J. WHITEMAN.

Knowing you to be a bee-keeper, I call your attention to a bee-hive which seems to overcome all difficulties connected with former hives—it is the Champion hive. Although this hive has not so large a circulation as others of prior invention, it has, considering its recent introduction, obtained a greater popularity than any former hive. No one need fear being humbugged by purchasing this hive, as every hive is warranted to give satisfaction. If any party will not warrant their goods, it shows that they themselves have no confidence in their merits.

FROM O. M. DENNISON, DES MOINES, IOWA.

E. KRETCHMER, Esq.—*Dear Sir:* During my travelling in the northern part of this State and Minnesota, I find your hive in general use; and wherever it makes its appearance, all other patent hives are discontinued and your cheap double-sided hives are substituted: a double hive was just what was wanting; your hive contains it and MANY OTHER SUPERIOR FEATURES NOT CONTAINED IN ANY OTHER MOVABLE-COMB HIVE. All persons with whom I conversed on the subject, expressed entire satisfaction.

—————o—————

S. H. Kridelbaugh, M. D., one of the best bee masters in the West, and Entomological editor of the "Western Pomologist," writes:

CLARINDA, IOWA, Feb. 26, 1872.

E. KRETCHMER.—*Dear Sir:* I have now used the "Champion Bee-Hive" four seasons, and can say from experience that I prefer it to all others of which I have a knowledge. I believe that your patent on the Champion hive, and that of L. L. Langstroth, covers all the patentable principles of movable-comb frames, allowing bees an upward passage into surplus honey receptacles, an indispensable feature in bee culture. Of the two hives I prefer the CHAMPION, because it dispenses with the honey board and air chamber, and brings surplus honey receptacles down close to the comb-frames, saving distance of travel and preserving heat in the boxes which enables bees to work later in the fall. Another reason for preferring the CHAMPION, is that it is not shallow, has a movable side which gives the bee keeper every opportunity to examine his colonies at pleasure without the least danger of destroying a single bee. For my part, taking all things into consideration, I want no better hive than the CHAMPION.

I am, truly, S. H. KRIDELBAUGH.

—————o—————

RED OAK, IOWA, April 3, 1872

E. KRETCHMER.—*Dear Sir:* Last season I used your combined Feeder and Ventilator on one colony of bees and its increase, feeding them during the scarcity of forage with three dollars worth of sugar syrup, thereby keeping them at breeding to full capacity, and as the result, increased them to SIX FULL COLONIES, and obtained ONE HUNDRED AND TWENTY pounds of surplus honey. I will want not less than 75 of your Feeder and Ventilators for this season's use. I consider no hive complete without them.

E. D. GODFREY.

The above is from an energetic bee keeper, who keeps a large Apiary and is familiar with everything pertaining to improved bee culture.





KING BROS.
BOOKS BOUGHT AND SOLD
1174 Market St.
San Francisco

